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San Francisco] BULLETIN No. 117 [Sept. 1939

CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1938

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FOR 1938

By
HENRY H. SYMONS

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LETTER OF TRANSMITTAL

September, 1939

To His Excellency, The Honorable Culbert L. Olson,

Governor of the State of California.

Sir: I have the honor to herewith transmit Bulletin No. 117 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

George D. Nordenholt,
Director, Department of Natural Resources.

INTRODUCTION

It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,
State Mineralogist.

MINERAL INDUSTRY, CALIFORNIA, 1938

DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

CHAPTER ONE

The total value for the mineral output for California for the year 1938 was $380,444,976, being an increase of $18,929,025 over the total of 1937, which was $361,515,951. There were sixty different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the State contributed to the list.

As revealed by the data following, the salient features of 1938 compared with the previous year were: The fuels, metals, and salines groups showed increases in total value, while structural materials and industrial minerals showed a decline. Of the year's mineral production petroleum showed the greatest increase in value of output; followed in turn by gold, natural gas, potash, soda magnesium salts, iron ore, salt, pumice and volcanic ash, quicksilver, and limestone; while those showing a decrease in amount and value were miscellaneous stone, brick and hollow building tile, copper, cement, silver, pottery clay, diatomite, lead, etc. Returned to the commercial after several years absence, were lithia salts and serpentine; and for the first time were added alum minerals and garnets.

Of the fuels, petroleum showed an increase in value of $20,508,471 and an increase in amount from 238,558,562 barrels to 249,395,763 barrels of crude oil. There was no marked change in the price of crude from June, 1936. Natural gas showed an increase in value and amount from 323,883,710 M cu. ft. worth $19,859,865 to 332,358,439 M cu. ft., worth $22,310,755.

Of the metals, the gold output increased from 1,174,578 fine ounces to 1,311,129 fine ounces; and in value from $41,110,230 to $45,889,515. Quicksilver increased from 9,995 flasks worth $837,789 to 12,171 flasks worth $846,497. Iron ore, platinum and tungsten concentrates also showed an increased yield with all other metals showing a decline. Silver decreased from 2,888,265 fine ounces worth $2,234,073, to 2,590,804 fine ounces worth $1,674,863 and copper from 10,512,500 pounds worth $1,272,013 to 1,613,491 pounds worth $158,122.

Of the structural materials, slate, bituminous rock and limestone were the only substances to show an increased total value over the previous year, miscellaneous stone showing a decrease in total value from $16,917,683 to $11,734,038 and cement from 12,072,063 barrels

worth $16,546,229 to 10,561,037 barrels worth $15,502,574. The group as a whole showed a decline in total value from $37,976,624 to $30,880,924.

In the industrial group the total value decreased from $6,159,918 to $5,027,093. The total value of the saline group increased from $13,216,270 to $14,279,949, with all the products showing an increased value with the exception of borates.

By Substances.

The following table shows the comparative yield of mineral substances of California for 1937 and 1938, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite (fuller's earth)	8,425 tons	$140,261	9,374 tons	$113,164	$27,097—
Borates	326,099 tons	6,206,619	276,144 tons	5,014,237	1,192,650—
Brick and hollow building tile		3,083,902		2,594,546	489,356—
Cement	12,072,062 bbls.	16,546,229	10,561,037 bbls.	15,502,574	1,043,655—
Chromite	1,918 tons	20,830	*	*	*
Clay (pottery)	354,669 tons	705,200	304,564 tons	582,608	112,592—
Coal	*	*	275 tons	1,650	*
Copper	10,512,500 lbs.	1,272,013	1,613,491 lbs.	158,122	1,113,891—
Dolomite	12,371 tons	24,603	*	*	*
Feldspar	2,686 tons	10,930	*	*	*
Gems		2,075		4,575	2,500+
Gold	1,174,578 fine ozs.	41,110,230	1,311,129 fine ozs.	45,889,515	4,779,285+
Granite		207,738		131,386	76,352—
Gypsum	186,160 tons	384,431	161,996 tons	327,821	56,610—
Iron ore	5,490 tons	29,340	*	*	*
Lead	2,402,110 lbs.	141,724	1,003,096 lbs.	46,142	95,582—
Lime	69,532 tons	681,277	70,578 tons	683,403	2,126+
Limestone	351,755 tons	830,562	302,655 tons	729,149	101,413—
Magnesium salts	3,867 tons	316,669	24,176 tons	469,636	152,967+
Marble[a]		23,667		6,015	17,552—
Mineral water	18,309,729 gals.	1,130,810	26,900,959 gals.	853,998	276,812—
Natural gas	323,883,714 M cu.ft.	19,859,865	332,358,439 M cu.ft.	22,310,755	2,450,890+
Petroleum	238,558,562 bbls.	237,845,872	249,395,763 bbls.	258,354,343	20,508,471+
Platinum group	530 fine ozs.	23,704	1,069 fine ozs.	35,150	11,446+
Pumice and volcanic ash	10,392 tons	79,005	18,783 tons	105,207	26,202+
Quicksilver	9,995 flasks	837,789	12,171 flasks	846,497	8,708+
Salt	370,431 tons	1,044,325	395,746 tons	1,099,737	56,126+
Sandstone		15,680		9,384	6,296—
Silica (sand and quartz)	84,313 tons	348,987	63,167 tons	278,676	70,311—
Silver	2,888,265 fine ozs.	2,234,073	2,590,804 fine ozs.	1,674,863	559,109—
Slate		32,572	6,871 tons	30,281	2,291—
Soapstone and talc	29,657 tons	347,772	28,346 tons	290,810	56,962—
Soda	153,685 tons	1,461,057	178,105 tons	2,023,610	562,553+
Stone, miscellaneous[b]		16,917,683		11,734,038	5,183,645—
Tungsten ore	611 tons	782,187	768 tons	786,860	4,673+
Zinc	39,643 lbs.	2,577	17,554 lbs.	843	1,734—
Unapportioned		[c]6,813,693		[d]7,755,381	941,688+
Totals		$361,515,951		$380,444,976	
Net increase					$18,929,025

* Included under 'Unapportioned.'

[a] Includes onyx and travertine.

[b] Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

[c] Includes barite, bituminous rock, bromine, carbon dioxide, calcium chloride, coal, diatomite, fluorspar, iodine, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon, tube-mill pebbles.

[d] Includes alum, barite, bituminous rock, bromine, carbon dioxide, calcium chloride, calcium silicate, chromite, diatomite, dolomite, feldspar, garnets, iodine, iron ore, lithia, magnesite, mica, potash, pyrite, sillimanite group, serpentine, sulphur, paving blocks, tube-mill pebbles.

By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1937 and 1938:

County	1937	1938
Alameda	$2,476,302	$2,531,600
Alpine	22,791	11,123
Amador	3,917,866	3,880,444
Butte	1,798,992	2,177,265
Calaveras	3,279,250	4,357,938
Colusa	9,424	2,884
Contra Costa	1,867,309	2,116,285
Del Norte	30,647	15,997
El Dorado	2,607,972	2,207,099
Fresno	41,178,791	30,159,518
Glenn	136,368	60,138
Humboldt	100,715	97,181
Imperial	677,401	604,227
Inyo	1,439,009	1,583,893
Kern	74,162,134	71,528,574
Kings	11,008,597	15,410,875
Lake	392,585	281,098
Lassen	86,240	59,546
Los Angeles	100,337,635	125,027,054
Madera	133,165	29,916
Marin	300,204	189,843
Mariposa	1,270,774	1,588,861
Mendocino	114,705	46,378
Merced	2,535,126	2,867,501
Modoc	36,990	5,896
Mono	804,925	349,516
Monterey	262,651	187,144
Napa	356,146	637,963
Nevada	11,385,056	11,667,896
Orange	22,659,380	21,601,082
Placer	1,754,040	2,020,042
Plumas	2,354,957	878,277
Riverside	4,057,127	3,306,793
Sacramento	4,230,689	5,467,487
San Benito	504,510	527,192
San Bernardino	16,012,330	16,752,866
San Diego	591,479	535,722
San Francisco	41,825	33,607
San Joaquin	706,620	781,907
San Luis Obispo	323,691	242,500
San Mateo	2,310,784	2,026,217
Santa Barbara	10,709,056	10,683,722
Santa Clara	722,903	624,463
Santa Cruz	2,074,463	1,907,188
Shasta	2,199,423	1,791,727
Sierra	974,680	905,237
Siskiyou	1,200,351	1,510,815
Solano	145,567	431,677
Sonoma	273,063	232,495
Stanislaus	940,030	845,523
Sutter	22,959	28,973
Tehama	65,193	81,431
Trinity	721,290	1,493,132
Tulare	314,952	273,199
Tuolumne	1,012,180	1,130,263
Ventura	19,230,720	21,966,416
Yolo	44,171	48,232
Yuba	2,587,748	2,633,138
Total value	$361,515,951	$380,444,976

Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later

Plumas County. Cement increased rapidly from 1902, while crushed rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915–1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920–1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927–1928, with declines in other metals and by petroleum. Natural gas showed a steady increase from 1907, and in 1928–1933 its value was second only to petroleum.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1938 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	$19,785,868	$13,588,614	$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	142,890,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
1937	361,515,951	41,110,230	237,845,872
1938	380,444,976	45,889,515	258,345,343
Totals	$8,044,299,074	$913,439,263	$5,117,608,016

CHAPTER TWO

FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 74 per cent of the State's entire mineral output for the year 1938.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1937 and 1938 is shown in the following table:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Coal	369 tons	$2,933	275 tons	$1,650	$1,283—
Natural gas	323,883,714 M cu.ft.	19,859,865	332,358,439 M cu.ft.	22,310,755	2,450,890+
Petroleum	238,558,562 bbls.	237,845,872	249,395,763 bbls.	258,354,343	20,508,471+
Total value		$257,708,670		$280,666,748	
Net increase					$22,958,078

COAL

Bibliography: State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, Pt. III.

The coal production in California during 1938 totaled 275 short tons valued at $1,650, as compared with the 1937 output which was 369 short tons worth $2,933. The material mined 1938 came from a single property each, in Amador, San Benito, and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	$38,065	1901	150,724	$401,772
1862	23,400	134,550	1902	88,460	248,622
1863	43,200	248,400	1903	93,026	265,383
1864	50,700	291,525	1904	79,062	376,494
1865	60,530	348,048	1905	46,500	144,500
1866	84,020	483,115	1906	24,850	61,600
1867	124,690	716,968	1907	23,734	55,849
1868	143,676	826,137	1908	18,496	55,503
1869	157,234	904,096	1909	49,389	216,913
1870	141,890	815,868	1910	11,033	23,484
1871	152,493	876,835	1911	11,047	18,297
1872	190,859	1,097,439	1912	14,484	39,092
1873	186,611	1,073,013	1913	25,198	85,809
1874	215,352	1,238,274	1914	11,859	28,806
1875	166,638	958,169	1915	10,299	26,662
1876	128,049	736,282	1916	4,037	7,030
1877	107,789	619,787	1917	3,527	7,691
1878	134,237	771,863	1918	6,343	16,149
1879	147,879	850,304	1919	2,983	8,203
1880	236,950	1,362,463	1920	2,078	5,450
1881	140,000	805,000	1921	12,467	63,578
1882	112,592	647,404	1922	27,020	135,100
1883	76,162	380,810	1923	1,010	5,090
1884	77,485	309,950	1924	1,425	8,800
1885	71,615	286,460	1925	730	3,880
1886	100,000	300,000	1926	1,100	5,000
1887	59,000	150,000	1927	200	1,100
1888	95,000	380,000	1928	782	4,542
1889	121,280	288,232	1929	450	2,476
1890	110,711	283,019	1930	10,885	59,858
1891	93,301	204,902	1931	12,551	77,607
1892	85,178	209,711	1932	9,508	36,468
1893	72,603	167,555	1933	2,612	11,367
1894	59,887	139,862	1934	13,549	52,720
1895	79,858	193,790	1935	8,049	32,745
1896	70,649	161,335	1936	370	1,815
1897	87,449	196,255	1937	269	2,933
1898	143,045	337,475	1938	275	1,650
1899	160,941	420,109			
1900	176,956	535,531	Totals	5,267,910	$23,388,639

The tonnages in the above table for the years 1861–1866 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93–94), being an average of $5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

NATURAL GAS

Bibliography: State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug. 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not overestimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas

production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Actual Production of Natural Gas—How Disposed of in California—1938

County	Production M cubic feet	Utilized M cubic feet	Wasted M cubic feet	Stored M cubic feet
Fresno	62,481,144	58,337,848	3,071,648	1,071,648
Kern	80,442,603	68,974,794	5,951,004	5,516,805
Kings	57,013,559	53,242,662	2,803,372	967,525
Los Angeles	91,560,826	73,790,818	17,449,845	320,163
Orange	22,012,416	20,551,546	1,429,977	30,893
San Joaquin	5,817,591	5,720,352	97,239	
Santa Barbara	5,676,608	4,655,732	864,327	156,549
Solano	3,783,466	3,760,158	23,308	
Ventura	44,058,744	43,239,220	216,301	603,223
Other counties	85,309	85,309		
Totals	372,932,266	332,358,439	31,907,021	8,666,806

Production and Value.

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1938 gave from 1.5¢ to 69¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1938 works out at approximately 6.71¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1938

County	M cubic feet	Value
Fresno	58,337,848	$3,626,724
Kern	68,974,794	4,244,897
Kings	53,242,662	3,290,978
Los Angeles	73,790,818	5,451,390
Orange	20,551,546	1,510,990
San Joaquin	5,720,352	503,667
Santa Barbara	4,655,732	327,466
Solano	3,760,158	354,926
Ventura	43,239,220	2,990,127
Butte, Glenn, Humboldt, Mendocino, Monterey, Sutter, Tulare, Yolo*	85,309	9,590
Totals	332,358,439	$22,310,755

* Combined to conceal the output of individual operators in each.

The above totals showed an increase in amount and value compared with the figures of the previous year, which were 323,883,714 M cu. ft. worth $19,859,865. Los Angeles County led in the yield of natural gas during 1938, followed in turn by Kern and Fresno counties. Increased value of output was shown by Kern, Kings, and Los Angeles counties; while a decrease was shown by all other counties.

Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854–1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production in California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888	[a]12,000	$10,000	1914	16,529,963	$1,049,470
1889	[a]14,500	12,680	1915	21,992,892	1,706,480
1890	[a]41,250	33,000	1916	28,134,365	2,871,751
1891	[a]39,000	30,000	1917	44,343,020	2,964,922
1892	[a]75,000	55,000	1918	46,373,052	3,289,524
1893	[a]84,000	68,500	1919	52,173,503	4,041,217
1894	[ab]85,000	75,000	1920	58,567,772	3,898,286
1895	[ab]110,000	100,000	1921	67,043,797	4,704,678
1896	[ab]131,000	110,157	1922	103,628,027	6,990,030
1897	[a]71,300	62,657	1923	240,405,397	15,661,433
1898	[a]111,165	74,424	1924	209,021,596	15,153,140
1899	115,110	95,000	1925	194,719,924	15,890,082
1900	40,566	34,578	1926	214,549,477	19,465,347
1901	120,800	92,034	1927	224,686,940	20,447,294
1902	120,968	99,443	1928	260,887,116	22,260,947
1903	120,134	75,237	1929	400,129,201	29,675,546
1904	144,437	91,035	1930	315,513,952	24,559,840
1905	148,345	102,479	1931	344,959,920	16,690,695
1906	168,175	109,489	1932	284,168,872	16,272,061
1907	169,991	114,759	1933	271,743,544	15,403,514
1908	842,883	474,584	1934	263,207,517	14,408,761
1909	1,148,467	616,932	1935	302,447,193	17,680,661
1910	10,579,933	1,676,367	1936	298,922,708	18,585,970
1911	[a]5,000,000	491,859	1937	323,883,714	19,859,865
1912	[a]12,600,000	940,076	1938	332,358,439	22,310,755
1913	14,210,836	1,053,292			
			Totals	4,967,596,761	$342,540,871

[a] Quantity, in part, estimated, where values only were reported.
[b] Tabulations published previously to 1933 included values of CO_2, now shown under "Industrial Materials."

Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the old fields, and such gas carries varying amounts of gasoline. A total of 95 plants were in operation in 1938 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 576,673,643 gallons of casing-head gasoline valued at $34,150,247 was reported made from all fields in California by 95 plants during 1938 compared with 649,774,253 gallons worth $40,051,437 from 94 plants in 1937. In 1938 there was also a total of 24,243,094 gallons of liquified petroleum gas produced for chemical manufacturing, industrial and domestic fuel. The 1938 output was distributed as follows:

County	No. plants	Gallons	Value
Fresno	1	104,634,004	$6,222,277
Kern	21	66,738,641	3,836,993
Kings	8	78,653,598	4,689,138
Los Angeles	34	183,201,646	10,758,111
Orange	12	64,281,504	4,153,509
Santa Barbara	7	15,468,953	897,929
Ventura	12	63,695,297	3,592,290
Totals	95	576,673,643	$34,150,247

The usual recoveries of gasoline from natural gas vary from ½ gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen [1] gives the average recovery for 1938 as 1.711 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cubic feet natural gas treated	Gallons of gasoline recovered	Recovery gallons per M cu. ft.
Oil absorption	388,015,152	663,993,285	1.711

PETROLEUM

Bibliography: State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII-XXXIV. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1938 amounted to a total of 249,395,763 barrels having a value of $258,354,343 at the well. This was an increase in both amount and value as compared with the 1937 output which was 238,558,562 barrels worth $237,845,782.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929–1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in

[1] Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1938), U. S. Bureau of Mines.

each field [1] and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934–1938 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

TABLE A

Production and Value of Crude Oil by Counties

County	1937		1938	
	Barrels	Value	Barrels	Value
Fresno	29,041,322	$36,521,804	20,784,106	$26,201,849
Kern	69,878,714	61,905,918	66,003,496	58,803,255
Kings	5,800,589	8,062,833	8,717,827	12,117,779
Los Angeles	86,659,477	83,922,309	106,545,794	113,407,606
Orange	22,060,820	20,854,524	20,667,775	19,768,434
Santa Barbara	8,273,815	8,961,642	9,555,145	9,309,262
Ventura	16,720,713	17,562,688	16,979,962	18,707,689
San Bernardino, San Luis Obispo, San Mateo, Santa Clara, Tulare*	73,112	54,154	51,658	88,469
Totals	238,558,562	$237,845,872	249,395,763	258,354,343

* Combined to conceal the output of operators in each.

The foregoing totals show an average price of $1,038 per barrel for the year 1938, as compared with .997 in the year 1937. $0.986 in 1936, $0.870 in 1935, $0.913 in 1934, $0.831 in 1933, and $0.807 in 1932.

TABLE B

Average Price of Oil per Barrel, by Counties, 1929-1938

County	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Fresno	$0.519	$0 568	$0.551	$0.556	$0 573	$0.650	$0.941	$1.209	$1.255	$1.261
Kern	.741	.838	.636	.658	.665	.729	.729	.863	.886	.890
Kings	1.674	1.515	.723	.837	.934	1.085	1.045	1.338	1.390	1.390
Los Angeles	1.189	1.208	.784	.860	.892	.990	.914	.974	.968	1.064
Orange	.986	1.060	.753	.762	.827	.937	.898	.937	.945	.956
San Luis Obispo				.550						
Santa Barbara	1.255	1.404	.954	.962	.848	.951	.924	1.143	10.83	.974
Santa Clara				.550						
Ventura	1.150	1 396	.771	.849	.838	.944	.901	.971	1.050	1.102
State averages	$1.094	$1.195	$0 753	$0.807	$0.831	$0 913	$0.970	$0 986	$0.997	$1 038

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San

[1] By courtesy of Standard Oil Company of California.

Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,[1] in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."[2]

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new

[1] Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.
[2] *Idem*, p. 301.

fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Fresno, Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C

Total Petroleum Production in California

Year	Barrels	Value	Year	Barrels	Value
To and including 1875	[a]175,000	[b]$472,500	1908	48,306,910	$26,566,181
1876	12,000	30,000	1909	58,191,723	32,398,187
1877	13,000	29,250	1910	77,697,568	37,689,542
1878	15,227	30,454	1911	84,648,157	40,552,088
1879	19,858	39,716	1912	89,689,250	41,868,344
1880	40,552	60,828	1913	98,494,532	48,578,014
1881	99,862	124,828	1914	102,881,907	47,487,109
1882	128,636	257,272	1915	91,146,620	43,503,837
1883	142,857	285,714	1916	90,262,557	57,421,334
1884	262,000	655,000	1917	95,396,309	86,976,209
1885	325,000	750,750	1918	99,731,177	127,459,221
1886	[a]377,145	[b]870,205	1919	101,182,962	142,610,563
1887	678,572	1,357,144	1920	103,377,361	178,394,937
1888	690,333	1,380,666	1921	112,599,860	203,138,225
1889	303,220	368,048	1922	138,468,222	173,381,265
1890	307,360	384,200	1923	262,875,690	242,731,309
1891	323,600	401,264	1924	228,933,471	274,652,874
1892	385,049	561,333	1925	232,492,147	330,609,829
1893	470,179	608,092	1926	224,673,281	345,546,677
1894	783,078	1,064,521	1927	231,195,774	260,735,498
1895	1,245,339	1,000,235	1928	231,811,465	229,998,680
1896	1,257,780	1,180,793	1929	292,534,221	321,366,863
1897	1,911,569	1,918,269	1930	227,328,988	271,699,046
1898	2,249,088	2,376,420	1931	188,310,605	141,835,723
1899	2,677,875	2,660,793	1932	177,745,286	142,890,247
1900	4,319,950	4,152,928	1933	172,139,362	143,063,972
1901	7,710,315	2,961,102	1934	174,721,282	159,529,671
1902	14,356,910	4,692,189	1935	205,979,855	179,335,311
1903	24,340,839	7,313,271	1936	214,776,227	211,667,185
1904	29,736,003	8,317,809	1937	238,558,562	237,845,872
1905	34,275,701	9,007,820	1938	249,395,763	258,354,343
1906	32,624,000	9,238,020			
1907	40,311,171	16,783,943	Totals	5,148,116,162	$5,121,223,533

[a] U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

[b] Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

Well Data:

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D

Wells Operated, by Fields, 1938

Field	Wells producing Dec., 1937	Wells producing Dec., 1938	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1937	Bbls. per well produced per day Dec., 1938
Group No. 1—Belridge—North	50	59	21	29,966	2	323.0	219.8
Belridge—South	127	87	4	165	0	12.2	13.6
Canal	1	15	12	27,917	0	467.0	259.5
Canfield Ranch		1	3	5,142	2		41.0
Coalinga	914	816	12	13,856	28	16.5	11.7
Coles Levee		1	1	826	0		179.0
Edison	89	88	2	285	3	42.5	28.6
Elk Hills	170	170	2	65	3	64.5	59.7
Fruitvale	159	174	18	4,625	3	54.6	42.4
Greeley	10	11	7	13,117	10	377.2	200.7
Kern River	1,334	1,369	26	1,163	8	11.5	8.3
Kettleman Middle Dome	3	3			0	29.3	13.0
Kettleman North Dome	179	218	30	60,254	5	459.1	274.6
Lost Hills	204	243	5	424	8	18.0	13.2
McKittrick	217	187	5	588	20	20.1	18.6
Midway-Sunset	2,525	2,519	33	3,328	53	29.4	22.5
Mountain View	196	189	3	3,533	12	79.2	48.9
Mount Poso	278	265	17	3,460	18	75.3	52.1
Rio Bravo	1	24	23	79,434	0	2,559.0	358.5
Round Mountain	161	193	35	9,684	15	106.6	66.8
Ten Section	8	26	25	60,820	0	457.8	335.3
Tupman			1	3,752	0		
Wasco		3	2	9,528	2		211.0
Wheeler Ridge	28	27			0	11.1	11.4
Group No. 2—Capitan	40	51	6	2,457	0	75.4	55.1
Elwood	83	80			3	92.1	60.1
Rincon	36	51	9	2,637	0	85.3	75.2
San Miguelito	15	19	4	3,027	1	246.0	131.0
Santa Barbara	36	34	1	30	5	15.8	12.4
Santa Maria	285	304	86	80,831	18	48.6	51.4
Summerland	19	18			0	1.6	1.3
Ventura Avenue	254	258	22	27,557	1	140.5	131.4
Ventura-Newhall	578	559	14	5,310	15	8.6	9.4
Watsonville	7	7			0	8.6	2.3
Group No. 3—Brea-Olinda	347	350	1	32	4	17.7	16.1
Coyote—East	83	86	4	1,285	1	49.7	32.1
Coyote—West	33	49	5	1,076	2	280.4	166.3
Dominguez	164	207	16	4,284	2	181.0	118.0
El Segundo	49	52	20	11,364	20	407.2	96.3
Huntington Beach	573	551	9	843	15	61.8	55.6
Inglewood	195	208	1	267	0	83.3	62.1
Lawndale	6	6			0	14.8	12.2
Long Beach	1,242	1,260	32	7,949	31	46.8	41.2
Los Angeles-Salt Lake	113	112			3	5.0	4.3
Montebello	206	221	32	32,667	6	35.1	74.1
Playa Del Rey	203	183			16	37.5	30.3
Potrero	11	13	2	1,110	0	78.7	77.8
Richfield	282	293	18	3,241	13	35.7	28.0
Rosecrans	83	112	31	32,873	9	67.4	132.6
Santa Fe Springs	659	590	2	141	21	62.2	51.1
Seal Beach	109	109	1	194	1	85.1	71.8
Torrance	531	659	129	39,648	12	14.3	29.2
Whittier	155	147			0	5.9	6.1
Wilmington	348	590	261	312,096	5	179.5	156.2
Group No. 4—Gas Fields:							
Buena Vista Lake	5	4					
Buttonwillow	16	26			1		
Chowchilla							
Delano	1						
Dudley Ridge							
Goleta	1						
McDonald Island	4	5	1	Gas			
Rio Vista	11	22	6	Gas	1		
Semi-Tropic	20	1			2		
Tracy	6	5					
Miscellaneous drilling					117		
Totals	13,463	13,930	1,000	920,851	517	52.4	46.4

Specific Gravity of Oils Produced.

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8°

TABLE E

Production of Light and Heavy Oils, by Fields, for 1938

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
San Joaquin Valley—			
Belridge—North	4,071	4,875,557	4,879,628
Belridge—South	24,018	413,172	437,190
Canal		847,404	847,404
Canfield Ranch		35,111	35,111
Coalinga	1,966,313	1,698,263	3,664,576
Coles Levee		5,550	5,550
Devils Den	3,354		3,354
Elison	517,922	566,497	1,084,419
Elk Hills	1,009,442	2,877,301	3,886,743
Fruitvale	2,661,641	465,579	3,127,220
Gatchell		239,009	239,009
Grapevine		52,248	52,248
Greeley		1,163,673	1,163,673
Kettleman Hills (North Dome)		25,609,197	25,609,197
Kettleman Hills (Middle Dome)		20,106	20,106
Kern River	4,001,756		4,001,756
Lost Hills	635,804	664,350	1,300,154
McKittrick	1,278,334	4,828	1,283,162
Midway-Sunset	8,327,491	14,550,782	22,878,273
Mountain View	3,271	4,009,381	4,012,652
Mount Poso	6,196,853		6,196,853
Poso Creek	630,146		630,146
Richfield Western		1,668	1,668
Rio Bravo		1,988,428	1,988,428
Round Mountain	5,269,841	140,701	5,410,542
Ten Section		2,476,092	2,476,092
Terra Bella	270		270
Wasco		126,698	126,698
Wheeler Ridge		113,036	113,036
Coastal—			
Arroyo Grande	17,600	13,943	31,543
Capitan		1,064,213	1,064,213
Elwood		2,247,760	2,247,760
Lompoc	58,150	20,750	78,900
Newhall	7,050	323,076	330,126
Rincon		1,395,553	1,395,553
San Miguelito		1,043,225	1,043,225
Santa Barbara Mesa	162,214		162,214
Santa Maria	5,155,838	867,414	6,023,252
Summerland	11,965		11,965
Ventura Avenue		12,924,549	12,924,549
Ventura County	74,785	1,494,354	1,569,139
Watsonville	21,900		21,900
Southern California—			
Coyote (East)	29,605	1,230,763	1,260,368
Coyote (West)		3,092,384	3,092,384
Del Rey	59,314	2,246,953	2,306,267
Dominguez		9,756,772	9,756,772
El Segundo	357,027	3,514,338	3,871,365
Huntington Beach	527,463	11,394,617	11,922,080
Inglewood	262,441	5,077,586	5,340,027
Lawndale		28,346	28,346
Long Beach	68,726	20,451,081	20,519,807
Los Angeles	73,156		73,156
Montebello	154,801	3,996,261	4,151,062
Olinda Brea	227,022	1,894,937	2,121,959
Potrero		220,275	220,275
Richfield	688,388	2,663,183	3,351,571
Rosecrans		3,738,107	3,738,107
Salt Lake	123,552		123,552
Santa Fe Springs	13,967	12,609,476	12,623,443
Seal Beach		3,195,202	3,195,202
Torrance	1,586,225	3,630,539	5,216,764
Whittier	229,897	107,391	337,288
Wilmington	10,828,148	23,330,063	34,158,211
Miscellaneous	700		700
Grand totals	53,270,461	196,517,742	249,788,203

Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast [1] territory totaled 158,477,420 barrels December 31, 1938, as compared with 128,040,247 barrels on December 31, 1937. The total decrease in stock over the preceding year was 30,437,173 barrels.

	Dec. 31, 1938 (barrels)
1. Gasoline-bearing crude	37,018,443
2. Nongasoline-bearing crude	16,282,177
3. Unblended natural gasoline	2,699,455
4. Gasoline (not including distributing and service stations)	13,259,369
5. Naphtha distillates	*1,566,349
6. Gas oil and Diesel oil	10,539,937
7. Fuel oil residuum	70,957,881
8. All other stocks	6,153,809
Total	158,477,420

*Estimated amount of unfinished gasoline contained in Item No. 5, 1,350,379 barrels.

Utilization of California Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oilfields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

During 1938 the crude oil consumed in California according to the U. S. Bureau of Mines [2] was 195,070,000 barrels sent to the still at the refineries; 26,053,000 barrels to Pacific foreign shipment; 725,000 barrels Atlantic foreign shipments, 923,000 barrels to intercoastal shipments; 11,203,000 barrels were either consumed as fuel or added to residuum and nongasoline-bearing crude; and 1,422,000 barrels to domestic market and loss not accounted for elsewhere.

[1] American Petroleum Institute: Summary of California Oilfield Operations for December, 1938.

[2] Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1938, U. S. Bureau of Mines.

The production of petroleum products during 1938 is shown in Table F:

TABLE F

Commodity	Amount in barrels
Crude petroleum to stills	195,069,000
Natural gasoline including liquid petroleum gas	15,870,000
Gasoline	78,020,000
Kerosene	4,914,000
Lubricating oils and greases	2,607,000
Gas oil and Diesel oil	26,737,000
Residuum from gasoline-bearing crude[a]	84,446,000
Asphalt and road oils	5,969,000
Coke (in tons)	317,000
Shortage and still gas production	7,547,000
Total petroleum (net)[b]	210,959,000

[a] Includes 11,203,000 bbls. of heavy crude oil.
[b] Total of crude oil and natural gas gasoline.

Operating Data.

The following tabulation (Table G) is compiled from data published by the State Division of Oil and Gas,[1] semiannually, and here combined to show the entire year's operations for all fields. The districts are the geographical subdivisions as administered by that Division and which are outlined on the accompanying map.

It will be noted that the State average yield of oil per-well-per-day was 89.8 barrels for the first six months of 1938 and 88.9 barrels for the second. This is somewhat higher than the figures 46.4 barrels average for December derived from American Petroleum Institute data as shown in Table D, on a previous page, due in part at least, to the fact that the latter is on a full-time basis, whereas the Division's figures allow for shut-down time.

[1] Summary of Operations—California Oil Fields; Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 34, No. 1, July, Aug., Sept., 1938, and No. 3, Jan., Feb., March, 1939.

TABLE G. Production Statistics and Operating Data of California Oil Fields—1938

Field	January 1 to June 30						July 1 to December 31					
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
				Oil	Water					Oil	Water	
Dist. 1—Aliso Canyon							1	23,418	67	349.5	4.1	36.4
Beverly Hills	4	23,990	706	34.0	25.4	97.5	4	20,074	514	36.9	79.9	73.9
Brea-Olinda	323	1,101,925	51,494	21.4	16.7	88.1	326	1,066,379	52,041	20.5	16.8	86.8
Coyote Hills	152	2,325,877	23,074	100.8	48.3	84.1	152	2,181,397	24,383	89.5	46.5	87.2
Dominguez	182	5,033,860	31,198	163.3	57.3	94.5	203	4,670,137	34,161	136.7	58.6	91.5
El Segundo	59	2,630,901	9,502	276.9	33.1	89.5	58	1,238,138	9,801	126.3	57.7	91.8
Huntington Beach	567	6,126,295	95,034	64.5	46.5	92.7	566	5,768,086	96,353	59.9	49.2	92.5
Inglewood	203	2,821,407	28,007	100.7	61.0	76.1	205	2,514,312	28,135	89.4	64.6	74.6
Lawndale	6	14,407	1,059	13.6	46.1	97.5	6	12,628	1,075	11.7	44.9	97.4
Long Beach	1,250	10,289,899	218,217	47.2	77.3	96.5	1,255	10,016,208	222,997	44.9	78.8	96.6
Los Angeles	81	33,643	14,222	2.4	1.9	97.0	81	34,037	14,334	2.4	3.4	96.2
Montebello	212	1,662,247	32,183	51.6	114.5	83.7	211	2,501,396	32,576	76.8	119.5	83.9
Newhall	65	112,494	11,041	10.2	3.2	94.3	67	195,555	12,143	16.1	3.2	98.5
Playa del Rey	205	1,20 ,050	35,317	34.2	71.9	95.4	196	1,035,776	33,785	30.7	73.9	93.7
Potrero	11	85,950	1,796	47.9	66.5	90.2	12	137,029	2,121	64.6	66.4	96.1
Richfield	296	1,652,698	46,016	35.9	16.4	86.0	292	1,517,799	45,142	33.6	15.4	84.0
Rosecrans	94	1,201,611	15,794	76.1	48.9	93.0	110	2,554,989	18,922	135.0	41.3	93.5
Salt Lake	8	44,242	1,363	32.5	111.7	94.1	8	42,358	1,375	30.8	109.7	93.4
Santa Fe Springs	655	6,835,336	110,201	62.0	91.2	93.0	600	5,766,338	100,083	57.6	102.7	90.7
Seal Beach	113	1,691,301	18,592	91.0	201.3	91.3	112	1,510,451	18,819	80.3	214.1	91.3
Torrance	519	1,710,482	86,220	19.8	7.9	91.7	611	3,372,574	101,173	33.3	8.0	90.0
Whittier	147	166,528	24,058	6.9	18.5	90.7	147	170,906	24,764	6.9	18.7	91.6
Wilmington	436	16,767,793	72,681	230.7	2.4	92.0	544	17,253,806	94,442	182.7	2.1	94.4
Los Angeles County	3	3,888	471	8.3	11.4	97.5	3	3,894	541	7.2	10.9	98.0
San Bernardino County	1	896	164	5.5	1.3	90.6	1	895	92	9.7	0.1	50.0
Totals	5,592	63,606,720	928,410	68.5	55.2	91.7	5,771	63,608,640	969,396	65.6	54.5	91.3
Dist. 2—Bardsdale	136	217,008	20,815	10.4	2.4	84.6	135	223,636	21,396	10.5	2.2	86.1
Conejo	0	0	0	0	0	0	9	90	54	1.7	16.7	3.3
Ojai	57	28,340	8,908	3.2	3.1	86.3	58	31,397	9,331	3.4	2.7	87.4
Piru	93	194,482	14,958	13.0	13.1	88.9	92	184,455	15,166	12.2	13.0	89.6
Rincon	58	1,277,259	9,529	134.0	22.1	90.8	67	1,157,824	10,792	107.3	21.8	87.5
Santa Paula	42	14,290	5,140	2.8	4.7	67.6	44	13,830	5,863	2.4	3.8	72.4
Sespe	21	46,620	2,815	16.6	7.5	74.1	24	51,392	3,259	15.8	11.1	73.8
Simi	56	18,816	8,810	2.1	0.4	86.9	56	17,599	8,853	2.0	0.4	85.9
South Mountain	84	263,176	10,374	25.4	1.0	68.2	84	264,563	11,462	23.1	0.8	74.2
Ventura	261	6,606,658	37,779	174.9	29.8	80.0	247	6,322,457	37,467	168.7	28.9	82.4
Ventura County	2	28,502	337	84.6	4.9	93.1	2	17,568	368	47.8	1.7	100.0
Totals	810	8,605,151	119,465	72.8	14.0	81.5	818	8,284,811	124,011	66.8	13.4	82.4

TABLE G. Production Statistics and Operating Data of California Oil Fields—1938—Continued

	Field	January 1 to June 30						July 1 to December 31					
		Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
					Oil	Water					Oil	Water	
Dist. 3	Arroyo Grande	15	19,035	2,278	8 4	1 2	83 9	15	19,577	2,167	9 0	1 7	78 5
	Capitan	42	513,751	6,317	86 1	8 3	83 1	49	523,677	6,916	75 7	17 4	76.7
	Casmalia	10	48,314	1,165	41 5	26 9	64 4	5	40,434	568	71 2	15 1	61 7
	Cat Canyon	13	730,241	1,688	432 6	13 3	71.7	15	980,626	1,777	551.8	16 9	64 4
	Elwood	79	1,284,056	13,922	92 2	185 0	97 4	75	964,251	12,512	77 1	186 5	90 7
	La Goleta Gas	[2]	0	0	0	0	0	[2]0	0	0	0	0	0
	Lompoc	7	53,578	847	63 3	119 8	66.9	5	36,982	622	59.5	144 6	67 6
	Mesa	35	90,295	6,000	15 0	112.1	94 7	35	72,006	6,023	12 0	108 1	93 5
	Santa Maria	127	448,424	19,770	22 7	28 1	86 0	120	413,261	18,849	21.9	29.3	85 4
	Santa Maria Valley	93	1,643,855	9,825	167 3	2 4	58 4	90	1,669,445	9,032	184 8	2 4	54 5
	Sargent	9	4,142	1,323	3 1	0	81 2	8	4,331	1,233	3 5	0	83 8
	Summerland	7	5,965	1,168	5 1	26 6[1]	92.2	7	5,894	1,239	4 6	15 1[1]	96 2
	San Mateo County— Half Moon Bay	----	----	----	----	----	----	2	1,462	276	5 3	0	75 0
	Totals	437	4,871,656	64,203	75.8	63 2	81 3	426	4,732,036	61,214	77 3	62 6	78 1
Dist. 4	Belridge	188	2,817,257	31,117	90 5	22.5	91 4	175	2,474,117	29,421	84 1	16 8	91 4
	Buena Vista Lake Gas	[1]	0	0	0	0	0	[2]	0	0	0	0	0
	Buttonwillow Gas	[8]	0	0	0	0	0	[9]	0	0	0	0	0
	Canal	5	266,221	702	379 2	5.5	77.6	12	579,089	2,016	287.2	5.7	91.3
	Canfield Ranch	1	20,063	144	139.3	.1	79.6	1	15,041	162	92.8	.6	88 0
	Devils Den	5	4,621	689	6 7	2 4	76.1	12	4,473	1,818	2 5	4.9	82.3
	Edison	86	617,993	14,107	43 8	14 7	90 6	83	490,133	12,198	40 2	14 7	79 9
	Elk Hills	175	1,976,628	29,359	67 3	96 6	92 7	170	1,900,904	29,051	65.4	97.3	92.9
	Elk Hills	[0]	0	0	0	0	0	[0]	0	0	0	0	0
	Fruitvale	168	1,672,528	28,053	59 6	13 5	92.3	170	1,414,737	25,480	55.5	18.4	81.5
	Greeley	14	649,499	1,958	331.7	4.5	77.3	17	513,786	2,474	207 7	10 7	79.1
	Kern River	1,412	2,220,092	238,656	9.3	33 0	93.4	1,419	1,957,324	239,508	8.2	33 1	91.7
	Lost Hills	255	667,204	42,539	15 7	32.3	92 2	258	622,566	43,595	14.3	33.4	91.8
	McKittrick-Temblor	222	672,287	35,630	18.9	89.8	88.7	200	606,260	32,702	18.5	92.9	88.9
	Midway-Sunset	2,570	12,358,908	413,771	29.9	30.9	89.0	2,515	10,570,602	401,190	26.4	31.1	86.7
	Midway-Sunset	[19]	0	0	0	0	0	[20]	0	0	0	0	0
	Mt. Poso	272	3,503,492	43,266	81.0	161.3	87.9	253	2,747,454	40,384	68.0	159.4	86.8
	Mountain View	183	2,256,458	30,390	74 3	30 0	91.7	175	1,744,406	27,453	63.5	30 0	85 3
	Mountain View	[2]	0	0	0	0	0	[2]	0	0	0	0	0

Poso Creek	61	288,134	9,913	29.1	25 4	89.8	65	242,365	9,866	24.6	31.5	82.5
Rio Bravo	4	480,250	642	748.1	6 0	88.7	19	1,462,073	3,144	465.0	6 2	89.9
Round Mountain	192	3,013,190	31,542	95 5	185 6	90.8	196	2,461,463	31,809	77.4	212.1	87 7
Semitropic Gas	[2]5	0	0	0	0	0	[2]4	0	0	0	0	0
Ten Section	17	978,334	2,830	345.7	5.3	92.0	29	1,494,445	5,098	293.1	6 3	95.5
Trico Gas	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Wasco	1	44,042	145	303.7	14.4	80 1	2	81,021	375	216.1	9.2	100 0
Wheeler Ridge	30	56,223	4,743	11.9	2.8	87.3	29	56,833	4,996	11.4	2.8	93.6
Kern County	4	46,093	574	80.3	8.1	79.3	6	44,887	784	57.3	14 6	71 0
Kern County	[2]0	0	0	0	0	0	0	0	0	0	0	0
Tulare County	2	1,320	265	5 0	3.0	73.2	0	0	0	0	0	0
Totals	5,867	34,610,837	961,035	36 0	45.2	90 5	5,806	31,483,979	943,524	33 4	45.9	88.3
DIST. 5—Coalinga	844	2,130,916	129,361	16.5	16.9	84.7	726	1,517,230	118,381	12.8	16 6	88.6
East Coalinga Extension							5	247,110	532	464 5	2 1	57.8
Kettleman Middle Dome	3	11,981	542	22.1	148.9	99.8	3	7,555	549	13 8	160 9	99.5
Kettleman North Dome	191	13,997,489	30,325	461 6	57 7	87.7	206	11,589,652	33,686	344.0	60 6	88.9
McDonald Island Gas	[2]4	0	0	0	0	0	[2]5	0	0	0	0	0
Rio Vista Gas	[2]16	0	0	0	0	0	[2]16	0	0	0	0	0
Tracy Gas	[2]4	0	0	0	0	0	[2]3	0	0	0	0	0
Glenn County—Willows Area							[2]0	0	0	0	0	0
Madera County—Chowchilla Area	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Sutter County—Marysville Buttes Area	[2]2	0	0	0	0	0	[2]1	0	0	0	0	0
Yolo County—Fairfield Knolls Area	[2]1	0	0	0	0	0	[2]1	0	0	0	0	0
Totals	1,038	16,140,386	160,228	100 7	25.1	85 3	940	13,361,547	153,148	87 2	26 8	88.5
Grand totals	13,744	127,924,750	2,233,441	65.2	53.2	89.8	13,761	121,471,013	2,251,766	53 9	47 0	88.9

[1] Estimated.
[2] Gas wells omitted from totals.

CHAPTER THREE

METALS

Bibliography: Reports of State Mineralogist I-XXXV (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1938 was $49,590,262. Chief among these is and always has been gold, followed by silver, copper, quicksilver, tungsten ore, lead, iron ore, platinum, and chromite.

A comparison of the 1937 output with that of the 1938 output is afforded by the following table:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Chromite	1,918 tons	$20,830		*	
Copper	10,512,500 lbs.	1,272,013	1,613,491 lbs.	$158,122	$1,113,891—
Gold	1,174,578 fine ozs.	41,110,230	1,311,129 fine ozs.	45,889,515	4,779,285+
Iron ore	5,490 tons	29,340		*	*
Lead	2,402,110 lbs.	141,724	1,003,096 lbs.	46,142	95,582—
Platinum group metals	530 ozs.	23,704	1,069 fine ozs.	35,150	11,446+
Quicksilver	9,985 flasks	837,789	12,171 flasks	846,497	8,708+
Silver	2,888,265 fine ozs.	2,234,073	2,590,804 fine ozs.	1,674,863	559,109—
Tungsten	611 tons	782,187	768 tons	786,860	4,673+
Zinc	39,643 lbs.	2,577	17,554 lbs.	843	1,734—
Unapportioned[a]				152,270	
Total values		$46,454,467		$49,590,262	
Net increase					$3,135,795

[a] Includes iron ore and chromite.
* Included under 'Unapportioned.'

ALUMINUM

Bibliography: Report XVIII, p. 198, XXXIV. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

ANTIMONY

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI, XXXIV. Bulletins 38, 91.

During 1938 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide, stibnite; but in the Kernville and Havilah districts in Kern County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (June 29, 1939) are around 14¢ per pound for Chinese (duty paid) and 12¢ for domestic antimony.

Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887	75	$15,500	1902		
1888	100	20,000	1915	510	$35,666
1889			1916	1,015	64,793
1893	50	2,250	1917	158	18,786
1894	150	6,000	1918		
1895	33	1,485	1925	*26	770
1896	17	2,320	1926		
1897	20	3,500	1927	20	590
1898	40	1,200	1928	20	761
1899	75	13,500	1929		
1900	70	5,700			
1901	50	8,350	Totals	2,429	$201,171

* Annual details concealed under 'Unapportioned.'

ARSENIC

Bibliography: Reports XVIII, XXIII, XXV, XXX, XXXIII, XXXV. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite ($FeAsO_4+2H_2O$), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

BERYLLIUM

Bibliography: State Mineralogist Report XXVII, XXXV. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of berryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (June 29, 1939) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent BeO, $30; minimum 12 per cent BeO, $35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

BISMUTH

Bibliography: State Mineralogist Report XXXV. Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at $2,400 in 1904, and credited to Riverside County.

The present quotation (June 29, 1939) for bismuth is $1.10 per pound, in ton lots for the refined metal.

CADMIUM

Bibliography: U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

The present quotation (June 29, 1939) for cadmium is 50¢ per pound for the refined metal.

CHROMITE

Bibliography: State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIV. Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During 1938 there were shipments of chromite or chromic iron ore in California from one deposit each in El Dorado, Fresno, and Placer counties, the annual details being concealed under the 'Unapportioned' item so as not to reveal the output of an operator. The 1938 production showed a decline in amount and value from that of 1937 which was 1,918 short tons, recalculated to a basis of 45% Cr_2O_3, valued at $20,830 f.o.b. shipping point, coming from two properties in Del Norte County and one each in El Dorado, Fresno, Placer, Santa Barbara, and Tulare counties. The total shipments for 1937 were the largest since 1919.

Occurrence.

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as periodotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Imports.

Imports of foreign chromite [1] to the United States duty free during 1938, came mainly from Southern Rhodesia, Union of South Africa, New Caledonia, Philippine Islands, Turkey, Greece, and India, totaled 352,085 long tons, valued at $4,854,892 for 1938, compared with 553,916 long tons worth $7,324,488 for 1937.

Total Chromite Production of California.

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at $329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1874–1887 (San Luis Obispo County)	26,028	$329,924	1913	1,180	$12,700
1887	3,000	40,000	1914	1,517	9,434
1888	1,500	20,000	1915	3,725	38,044
1889	2,000	30,000	1916	48,943	717,244
1890	3,599	53,985	1917	52,379	1,130,298
1891	1,372	20,580	1918	73,955	3,649,497
1892	1,500	22,500	1919	*4,314	97,164
1893	3,319	49,785	1920	1,770	43,031
1894	3,680	39,980	1921	347	6,870
1895	1,740	16,795	1922	379	6,334
1896	786	7,775	1923	84	1,658
1897			1924	350	6,700
1898			1925	191	3,712
1899			1926	393	7,063
1900	140	1,400	1927	225	5,063
1901	130	1,950	1928	729	15,179
1902	315	4,725	1929	327	5,025
1903	150	2,250	1930	84	1,905
1904	123	1,845	1931	441	6,737
1905	40	600	1932 / 1933 [a]	1,206	16,587
1906	317	2,859	1934	294	3,498
1907	302	6,040	1935	488	6,111
1908	350	6,195	1936	221	3,314
1909	436	5,309	1937	1,918	20,830
1910	749	9,707	1938	[a]	[a]
1911	935	14,197			
1912	1,270	11,260	Totals	249,243	$6,514,209

* Recalculated to 45% Cr_2O_3 beginning with 1919.
[a] Included under 'Unapportioned.'

[1] U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary of Foreign Commerce to the United States, Dec., 1938.

COBALT

Bibliography: Report XIV, XXXIII, XXXIV. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (June 29, 1939) is around 97 to 99% at $1.92 per pound for the refined metal.

COPPER

Bibliography: State Mineralogist Reports VIII-XXXV (inc.). Bulletins 23, 50, 91.

The total output of copper in California during 1938 amounted to 1,613,491 pounds recoverable metal valued at $158,122. This was a decrease in amount and value compared with the 1937 production, which was 10,512,500 pounds worth $1,272,013. The average price of copper in 1938 was 9.8¢ per pound compared with 12.1¢ in 1937; 9.2¢ in 1936; 8.3¢ in 1935; 8.0¢ in 1934; and 6.4¢ in 1935.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, in 1936 and 1937 by silver only, and in 1938 by silver, quicksilver and tungsten.

Distribution of the 1938 output of copper in California by counties was as follows:

County	Pounds	Value
Amador	5,152	$505
Calaveras	24,374	2,487
El Dorado	40,353	3,972
Imperial	70,000	6,860
Inyo	65,844	6,453
Los Angeles	2,128	209
Mariposa	4,328	424
Mono	3,050	299
Napa	4,450	436
Nevada	124,058	12,158
Placer	7,704	755
Plumas	1,202,974	117,891
Riverside	15,094	1,479
San Bernardino	24,723	2,423
San Diego	7,023	688
Tuolumne	2,899	284
Butte, Kern, Orange, Shasta, Sierra, Siskiyou*	8,155	799
Totals	1,613,491	158,122

* Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines[1] the smelter production of primary copper from domestic sources during 1938 amounted to 1,124,656,559 pounds, a decrease of approximately 33 per cent compared with the 1937 output. The value decreased approximately 45 per cent in 1938. The average price of copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 9.8¢ per pound.

[1] U. S. Bureau of Mines Mineral Market Report M. M. S. 754, March 23, 1939.

Copper Production of California, by Years.

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus' [1] had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882	826,695	$144,672	1911	36,838,024	$4,604,753
1883	1,600,862	265,743	1912	34,169,997	5,638,049
1884	876,166	120,911	1913	34,471,118	5,343,023
1885	469,028	49,248	1914	30,491,535	4,055,375
1886	430,210	43,021	1915	40,968,966	7,169,567
1887	1,600,000	192,000	1916	55,809,019	13,729,017
1888	1,570,021	235,303	1917	48,534,611	13,249,948
1889	151,505	18,180	1918	47,793,046	11,805,883
1890	23,347	3,502	1919	22,162,605	4,122,246
1891	3,397,405	424,675	1920	12,947,299	2,382,303
1892	2,980,944	342,808	1921	12,088,053	1,559,358
1893	239,682	21,571	1922	22,883,987	3,090,582
1894	738,594	72,486	1923	28,346,860	4,166,989
1895	225,650	21,901	1924	52,089,349	6,823,704
1896	1,992,844	199,599	1925	46,968,499	6,669,527
1897	13,638,626	1,540,666	1926	33,521,544	4,693,014
1898	21,543,229	2,475,168	1927	27,350,316	3,582,888
1899	23,915,486	3,990,534	1928	25,162,304	3,623,360
1900	29,515,512	4,748,242	1929	33,809,258	5,941,799
1901	34,931,788	5,501,782	1930	26,534,752	3,449,522
1902	27,860,162	3,239,975	1931	12,954,842	1,178,890
1903	19,113,861	2,520,997	1932	1,417,536	89,307
1904	29,974,154	3,969,995	1933	992,515	63,521
1905	16,997,489	2,650,605	1934	590,638	47,252
1906	28,726,448	5,522,712	1935	2,031,836	168,645
1907	32,602,945	6,341,387	1936	9,991,799	919,245
1908	40,868,772	5,350,777	1937	10,512,500	1,272,013
1909	65,727,736	8,478,142	1938	1,613,491	158,122
1910	53,721,032	6,680,641			
			Totals	1,169,205,492	$184,765,065

GOLD

Bibliography: State Mineralogist Reports I to XXXV (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, includ-

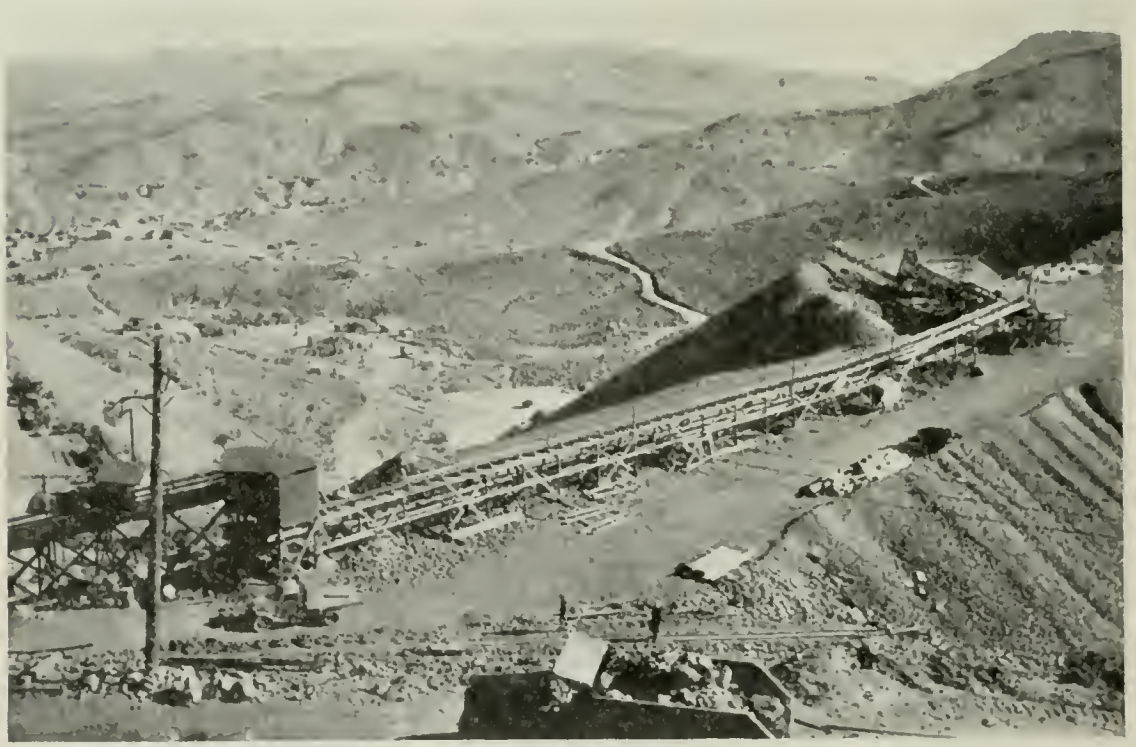
[1] Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

ing Alaska. In fact, at present, California is producing approximately 26% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last ten years, brought about by the present economic conditions. During 1938 there were 1603 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. There was no premium paid on gold during 1932, the price being $20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became $35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was $34.95.

The production of gold in California during 1938 totaled 1,311,129 fine ounces valued at $45,889,515, being an increase of 136,551 ounces over the 1937 yield. Deep or lode mines accounted for 738,616 fine ounces worth $25,851,560, and placers (mainly bucket-line, drag-line and power-shovel dredges) produced 572,513 fine ounces worth $20,037,955.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles



Conveyor belt for waste rock disposal at mill of Yellow Aster Mine, Kern County. Town of Randsburg in left-middle distance.

Photo by Walter W. Bradley

White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

The largest production of gold by counties in 1938 was reported by Nevada County with an output of 321,758 fine ounces ($11,261,530); Sacramento County second with 142,104 fine ounces ($4,973,640); Amador County third with 106,424 fine ounces ($3,724,840); Kern County fourth with 86,703 fine ounces ($3,034,605); Calaveras fifth with 83,035 fine ounces ($2,906,225); followed in turn by Yuba, Merced, Butte, Placer, El Dorado, Trinity, Shasta, Siskiyou, and Mariposa counties, all with a total output worth in excess of a million dollars.

Nevada held the first place as a gold producing county with an output exceeding that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Sacramento was in second place, exceeding Amador County, which held this place in 1937. The gold from Nevada, Amador and Kern counties is mainly from the lode or dump mines; while that from Sacramento and Yuba counties is almost entirely from dredges and that from Calaveras County is about equally divided between lode mines and dredges.

Distribution for the 1938 gold output by counties was as follows:

County	Number of operators*		Fine ounces	Value
	Lode	Placer		
Alpine	1	----	1	$35
Amador	43	28	106,424	3,724,840
Butte	18	38	53,782	1,882,370
Calaveras	55	50	83,035	2,906,225
Del Norte	----	3	20	700
El Dorado	71	33	42,423	1,484,805
Fresno	3	3	313	10,955
Humboldt	1	10	595	20,825
Imperial	15	4	12,814	448,490
Inyo	81	9	17,864	625,240
Kern	128	11	86,703	3,034,605
Los Angeles	12	10	4,906	171,710
Madera	14	14	271	9,485
Mariposa	70	17	30,909	1,081,815
Merced	----	5	59,724	2,090,340
Mono	20	1	3,354	117,390
Monterey	1	1	61	2,135
Napa	1	----	1,836	64,260
Nevada	30	29	321,758	11,261,530
Orange	1	1	7	245
Placer	26	67	51,599	1,805,965
Plumas	25	34	19,946	698,110
Riverside	25	5	2,200	77,000
Sacramento	2	15	142,104	4,973,640
San Bernardino	94	11	11,694	409,290
San Diego	5	3	88	3,080
San Francisco	----	a	74	2,590
San Joaquin	----	2	1,188	41,580
Santa Clara	1	----	1	35
Santa Cruz	----	a	10	350
Shasta	30	36	41,132	1,439,620
Sierra	20	38	25,728	900,480
Siskiyou	37	80	36,978	1,294,230
Stanislaus	----	6	12,950	453,250
Trinity	24	64	41,467	1,451,345
Tulare	5	2	40	1,400
Tuolumne	56	21	24,414	854,490
Ventura	1	----	19	665
Yuba	8	22	70,341	2,461,935
Lassen, Modoc, San Luis Obispo, Tehama**	3	3	2,356	82,460
Totals	927	676	1,311,129	$45,889,515

* Excludes itinerant prospectors, snipers, high-graders, and others who gave no evidence of legal right to property.
** Combined in order not to disclose individual mine production.
a Not reported.

The following is quoted from the advance statement of gold in 1938 by courtesy of the U. S. Bureau of Mines,* Department of Commerce:

"During the 10-year period ended with 1938, the value of the gold output of California increased 438 percent—from $8,526,703 in 1929 to $45,889,515 in 1938; the gain in 1938 over 1937 alone was equivalent to more than half the total value of the output in 1929. In quantity the 1938 gold output was greater than in any year since 1862, and in value it was greater than in any year since 1856. Gold production in 1938 exceeded that in 1937 by 12 per cent, whereas production in 1937 exceeded that in 1936 by only 9 per cent; this accelerating rate of increase is noteworthy in view of the upward trend that already has continued for 10 years.

"Although the data for gold production in California before 1901 do not segregate placer and lode gold it appears certain that the output of lode gold was larger in 1938 in both quantity and value than in any year in the history of the State. The quantity and value of placer gold produced are known to be higher in 1938 than in any year since 1900. Moreover, it is probable that the placer miners have not enjoyed so productive a year since unrestricted hydraulic mining flourished, over 50 years ago. Even better days for placer mining were anticipated when construction of large debris dams on rivers in the Sierra Nevada Mountains was begun under supervision of the California Debris Commission with River and Harbor Work funds. Early in 1939 the first debris dam, that on the North Fork of American River near Auburn, was completed, making practicable the reopening of a number of hydraulic mines in the large drainage basin above the dam. Another, the Upper Narrows Dam on Yuba River near Smartville, was projected for construction during 1939.

"The 25 leading gold properties, listed in the following table, produced 56 per cent of the total gold output of the State in 1938. Newcomers to the list in 1938 were three lode mines—the Cactus Queen, the Iron Mountain (which came just short of making the list in 1937), and the Sheepranch—and four connected-bucket dredging properties—the Merced dredge No. 1 of the Merced Dredging Co., the Butte Unit of Yuba Consolidated Gold Fields, the San Joaquin dredge No. 1 of the San Joaquin Mining Co., and the Yreka dredge of the Yreka Gold Dredging Co. These operations replaced on the list four lode mines and three connected-bucket dredging properties that failed to maintain their rank among the leading 25 gold producers in 1938. It will be noted that 12 of the 25 leading in 1938 derived their gold from gold ores, 11 from gravels worked by connected-bucket dredges, and the remaining two from gold-silver ores; the producers ranking first, second, and sixth are in the Grass Valley-Nevada City district."

Twenty-five Leading Gold Producers in California in 1938, in Approximate Order of Output

Mine	District	County	Operator	Source of gold
Empire Star Mines	Grass Valley-Nevada City	Nevada	Empire Star Mines Co., Ltd.	Gold ore
Idaho Maryland	Grass Valley-Nevada City	Nevada	Idaho Maryland Mines Corp.	Gold ore
Natomas Co.	Folsom	Sacramento	Natomas Co.	Dredge
Yuba Unit	Yuba River	Yuba	Yuba Cons. Gold Fields	Dredge
Capital dredge	Folsom	Sacramento	Capital Dredging Co.	Dredge
Lava Cap	Grass Valley-Nevada City	Nevada	Lava Cap Gold Mining Corp.	Gold ore
Central Eureka and Old Eureka	Mother Lode	Amador	Central Eureka Mining Co.	Gold ore
Carson Hill	Mother Lode	Calaveras	Carson Hill Gold Mining Corp.	Gold ore
Golden Queen	Mojave	Kern	Golden Queen Mining Co.	Gold ore
Merced Unit	Snelling	Merced	Yuba Cons. Gold Fields	Dredge
Cactus Queen	Mojave	Kern	Cactus Mines Co.	Gold-silver ore
Snelling Unit	Snelling	Merced	Snelling Gold Dredging Co.	Dredge
Iron Mountain	Iron Mountain	Shasta	The Mountain Copper Co., Ltd.	Gold ore
Merced dredge No. 1	Snelling	Merced	Merced Dredging Co.	Dredge
Yellow Aster	Randsburg	Kern	Anglo American Mining Corp., Ltd.	Gold ore
Sheepranch	East Belt	Calaveras	St. Joseph Lead Co.	Gold ore
Argonaut	Mother Lode	Amador	Argonaut Mining Co., Ltd.	Gold ore
Sixteen to One	Alleghany	Sierra	Original Sixteen to One Mine, Inc.	Gold ore
Big Canyon	West Belt	El Dorado	The Mountain Copper Co., Ltd.	Gold ore
Arroyo Seco	Mother Lode	Amador	Arroyo Seco Gold Dredging Co.	Dredge
Starlight	Mojave	Kern	Lodestar Mining Co.	Gold-silver ore
Butte Unit	Oroville	Butte	Yuba Cons. Gold Fields	Dredge
San Joaquin dredge No. 1	Snelling	Merced	San Joaquin Mining Co.	Dredge
Cosumnes dredge	Cosumnes River	Sacramento	Cosumnes Gold Dredging Co.	Dredge
Yreka dredge	Greenhorn	Siskiyou	Yreka Gold Dredging Co.	Dredge

* U. S. Bureau of Mines, Mineral Year Book, 1939, pp. 232-234.

Total Gold Production of California.

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,[1] and possibly 1820.[2] On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported [3] to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

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[1] Hittell, T. H., History of California, Vol. II, p. 12, 1885.
[2] Bancroft, H. H., History of California, Vol. II, p. 417, 1886.
[3] Mercantile Trust Review of the Pacific, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

Total Gold Production of California, 1848 to 1938

Year	Fine ounces	Value	Year	Fine ounces	Value
1848	11,866	$245,301	1895	741,798	$15,334,317
1849	491,072	10,151,360	1896	831,158	17,181,562
1850	1,996,586	41,273,106	1897	767,779	15,871,401
1851	3,673,512	75,938,232	1898	769,476	15,906,478
1852	3,932,631	81,294,700	1899	741,881	15,336,031
1853	3,270,803	67,613,487	1900	767,390	15,863,355
1854	3,358,867	69,433,931	1901	821,845	16,989,044
1855	2,684,106	55,485,395	1902	818,037	16,910,320
1856	2,782,018	57,500,411	1903	788,544	16,300,653
1857	2,110,513	43,628,172	1904	901,484	18,633,676
1858	2,253,846	46,591,140	1905	914,217	18,898,545
1859	2,217,829	45,846,599	1906	906,182	18,732,452
1860	2,133,104	44,095,163	1907	809,214	16,727,928
1861	2,026,187	41,884,995	1908	907,590	18,761,559
1862	1,879,595	38,854,668	1909	979,007	20,237,870
1863	1,136,897	23,501,736	1910	953,734	19,715,440
1864	1,164,455	24,071,423	1911	954,870	19,738,908
1865	867,405	17,930,858	1912	953,640	19,713,478
1866	828,367	17,123,867	1913	987,187	20,406,958
1867	883,591	18,265,452	1914	999,113	20,653,496
1868	849,265	17,555,867	1915	1,085,646	22,442,296
1869	881,830	18,229,044	1916	1,035,745	21,410,741
1870	844,537	17,458,133	1917	971,733	20,087,504
1871	845,493	17,477,885	1918	799,588	16,528,953
1872	748,951	15,482,194	1919	807,667	16,695,955
1873	726,554	15,019,210	1920	692,297	14,311,043
1874	835,186	17,264,836	1921	759,721	15,704,822
1875	816,377	16,876,009	1922	709,678	14,670,346
1876	755,169	15,610,723	1923	647,210	13,379,013
1877	798,249	16,501,268	1924	636,140	13,150,175
1878	911,343	18,839,141	1925	632,035	13,065,330
1879	949,439	19,626,654	1926	576,798	11,923,481
1880	968,986	20,030,761	1927	564,586	11,671,018
1881	929,920	19,223,155	1928	521,740	10,785,315
1882	829,458	17,146,416	1929	412,479	8,526,703
1883	1,176,329	24,316,873	1930	457,200	9,451,162
1884	657,900	13,600,000	1931	523,135	10,814,162
1885	612,478	12,661,044	1932	569,167	11,765,726
1886	711,911	14,716,506	1933	[a]613,579	15,683,075
1887	657,349	13,588,614	1934	[b]719,064	25,131,284
1888	616,000	12,750,000	1935	[c]890,430	31,165,050
1889	542,425	11,212,913	1936	1,077,442	37,710,470
1890	595,486	12,309,793	1937	1,174,578	41,110,230
1891	615,759	12,728,869	1938	1,311,129	45,889,515
1892	608,166	12,571,900			
1893	606,564	12,538,780	Totals	95,967,943	$2,060,925,706
1894	670,636	13,863,282			

[a] Value calculated at an average weighted price of $25.56 per fine ounce; previously $20.6718.
[b] Value calculated at an average weighted price of $34.95 per fine ounce.
[c] Value $35 per fine ounce, beginning 1935.

IRIDIUM (see under Platinum)

IRON ORE

Bibliography: State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII-XXXV (inc.). Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During 1938 shipments of iron ore were made in California coming from a single property each in Inyo, San Bernardino, and Santa Cruz County. The annual details are concealed under the 'Unapportioned' item so as not to reveal individual outputs. The 1938 output showed an increase in amount and value over that of 1937 which was 5,490 short tons worth $29,340.

The material mined during the year was hematite from Inyo and San Bernardino counties, and magnetite sands from Santa Cruz County. The hematite was used mostly in high-iron cement with some going to foundaries as a flux. Use of magnetite is not known.

There was also some high-grade limonite mined in Yuba County, but as it was used in the manufacture of pigments, it has been classed under Mineral Paints.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	$79,452	1918	3,108	$15,947
1882	2,073	17,766	1919	2,300	13,796
1883	11,191	106,540	1920	5,975	40,889
1884	4,532	40,983	1921	1,970	12,030
1885			1922	3,588	18,868
1886	3,676	19,250	1923	3,102	18,665
1887			1924		
1893	250	2,000	1925 [a]	785	4,710
1894	200	1,500	1926		
1895			1927 [a]	5,272	26,000
1907	400	400	1928		
1908			1930		
1909	108	174	1931 [a]	100	700
1910	579	900	1932		
1911	558	558	1934		
1912	2,508	2,508	1935 [a]	38,339	163,714
1913	2,343	4,485	1936	31,084	155,434
1914	1,436	5,128	1937	5,490	29,340
1915	724	2,584	1938	[a]	[a]
1916	3,000	6,000			
1917	2,874	11,496	Totals	146,718	$901,817

* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotaling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

[a] Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI, XXXIII-XXXV (inc.).

The production of lead in California during 1938 amounted to a total of 1,003,096 pounds of recoverable metal valued at $46,142 compared with the 1937 figures of 2,402,110 pounds worth $141,724. The average price of lead in 1938 was 4.6¢ per pound compared with 5.9¢ per pound in 1937, 4.6¢ in 1936; 4.0¢ in 1935; 3.7¢ in 1934; and 3.7¢ in 1933.

Distribution of the 1938 output of lead by counties was as follows:

County	Pounds	Value
Calaveras	1,583	$73
El Dorado	2,824	130
Inyo	322,004	14,812
Kern	6,994	322
Mono	6,039	278
Nevada	286,396	13,174
Orange	2,101	97
Placer	15,300	704
Plumas	2,276	105
Riverside	241,510	11,109
San Bernardino	88,888	4,089
Shasta	1,346	62
Sierra	17,608	810
Amador, Butte, Los Angeles, Mariposa, Siskiyou, Tuolumne*	8,227	377
Totals	1,003,096	$46,142

* Combined to conceal the output of individual operators in each.

Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines[1] during 1938 the production of primary lead in the United States was 331,964 short tons, valued at $30,541,000 being a decrease from the national production of 1937 which was 443,142 short tons worth $52,291,000.

[1] U. S. Bureau of Mines, Mineral Market Notes 742, May 8, 1939.

Lead Production of California, by Years.

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Lead Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1877	[a]7,836,000	$391,800	1909	2,685,477	$144,897
1878	8,640,000	328,320	1910	3,016,902	134,082
1879	4,502,000	191,335	1911	1,403,839	63,173
1880	4,200,000	215,460	1912	1,370,067	61,653
1881	6,680,000	325,316	1913	3,640,951	160,202
1882	[b]4,000,000	196,800	1914	4,697,400	183,198
1883	[c]3,400,000	145,520	1915	4,796,299	225,426
1884	3,200,000	120,512	1916	12,392,031	855,049
1885	2,000,000	80,900	1917	21,651,352	1,862,016
1886	2,000,000	93,400	1918	13,464,869	956,006
1887	[d]1,160,000	52,200	1919	4,139,562	219,397
1888	900,000	38,250	1920	4,903,738	392,300
1889	940,000	35,720	1921	1,149,051	51,707
1890	800,000	36,000	1922	6,511,280	358,120
1891	1,140,000	49,020	1923	9,934,522	695,416
1892	1,360,000	54,400	1924	4,984,387	398,751
1893	666,000	24,975	1925	7,352,422	639,661
1894	950,000	28,500	1926	8,067,873	645,429
1895	1,592,400	49,364	1927	2,748,440	173,151
1896	1,293,500	38,805	1928	1,882,795	109,102
1897	596,000	20,264	1929	1,428,777	90,014
1898	655,000	23,907	1930	3,542,796	176,241
1899	721,000	30,642	1931	3,934,240	145,568
1900	1,040,000	41,600	1932	2,418,626	72,480
1901	720,500	28,820	1933	772,463	28,583
1902	349,440	12,230	1934	804,911	29,655
1903	110,000	3,960	1935	1,142,405	45,695
1904	124,000	5,270	1936	1,098,545	50,533
1905	533,680	25,083	1937	2,402,110	141,724
1906	338,718	19,307	1938	1,003,096	46,142
1907	328,681	16,690			
1908	1,124,483	46,663	Totals	203,242,628	$11,826,404

[a] Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.
[b] Estimated.
[c] Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.
[d] Data from 1887 to date from reports of California State Mining Bureau.

MANGANESE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII-XXXV (inc.). Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

During 1938 there were no shipments of manganese ore reported in California. The material mined in 1935 came from a single property in Riverside County and was consumed in the steel mills of the State. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

Imports of foreign manganese ore into the United States [1] during 1938, mainly from Soviet Russia, Gold Coast, Cuba, and Brazil, amounted to 847,197 long tons of ore containing 402,578 tons of manganese valued at $4,760,327, as compared with 974,281 long tons containing 464,638 long tons of manganese worth $10,710,807.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore

[1] U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1938.

(including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

Manganese Ore Production in California, by Years.

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887	1,000	$9,000	1912	22	$400
1888	1,500	13,500	1913		
1889	53	901	1914	150	1,500
1890	386	3,176	1915	4,013	49,088
1891	705	3,830	1916	13,404	274,601
1892	300	3,000	1917	15,515	396,659
1893	270	4,050	1918	26,075	979,235
1894	523	5,512	1919	11,569	451,422
1895	880	8,200	1920	2,892	62,323
1896	518	3,415	1921	1,005	12,210
1897	504	4,080	1922	540	7,650
1898	440	2,102	1923	690	10,620
1899	295	3,165	1924	1,115	25,785
1900	131	1,310	1925	832	19,450
1901	425	4,405	1926	235	4,700
1902	870	7,140	1927		
1903	1	25	1928	*	
1904	60	900	1929	733	8,216
1905			1930	*	
1906	1	30	1931	207	2,576
1907	1	25	1932		
1908	321	5,785	1934	*	
1909	3	75	1935	432	4,630
1910	265	4,235	1936		
1911	2	40			
			Totals	88,883	$2,398,976

*Annual details concealed under 'Unapportioned.'

MOLYBDENUM

Bibliography: State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX, XXXIV, XXXV. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial ship-

ments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (June 29, 1939) quotations on molybdenum ores are 45¢ per pound of MoS_2 contained, f.o.b. mine, and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

During 1938 there was no production of molybdenum ore reported mined in California. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23% MoS_2 valued at $306. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator.

Molybdenum Production of California, by Years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	Tons	Value
1916	8	$9,945
1917	243	9,014
1918	[a]	300
1919		
1933 } 1934 [a]	[b]	306
Totals	252	$19,565

[a] 300 pounds of 90% MoS_2 concentrate.
[a] Annual details concealed under 'Unapportioned.'
[b] 1432 pounds of 91.23% MoS_2 concentrates.

NICKEL

Bibliography: State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX, XXXIV, XXXV. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (June 29, 1939) quotations for nickel are around 35¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

PLATINUM GROUP METALS

Bibliography: State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

Platinum-group metals mined during 1938 amounted to 1194.40 ounces crude shipped and sold, containing 1069.36 fine ounces worth $35,150. This metal came from properties in Butte, Calaveras, Merced, Humboldt, Nevada, Placer, Sacramento, Shasta, Siskiyou, Stanislaus, Tehama, Trinity, and Yuba counties. Of the above sold in 1938, 562.48 fine ounces were platinum; 145.43 fine ounces were iridium, 158.27 fine ounces were osmium; 139.02 fine ounces were osmiridium; and 64.16 fine ounces were a mixture of ruthenium, palladium, and rhodium. The 1937 output was 579 ounces crude containing 530 fine ounces worth $23,704.

Present quotations [1] (June 29, 1939) are platinum $35 a fine ounce; iridium 99 per cent plus, $65; osmium per fine ounce $48 to $50; palladium per fine ounce $24; ruthenium per fine ounce $35 to $40; rhodium per fine ounce $120 to $125.

Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	$10,400	1914	463	$14,816
1888	100	400	1915	667	21,149
1889	500	2,000	1916	886	42,642
1890	500	2,000	1917	610	43,719
1891	600	2,500	1918	571	42,788
1892	100	500	1919	*418	60,611
1893	80	440	1920	477	68,977
1894	75	517	1921	613	58,754
1895	100	600	1922	795	90,288
1896	150	900	1923	602	78,546
1897	162	944	1924	273	36,452
1898	150	900	1925	292	39,937
1899	300	1,800	1926	322	32,005
1900	300	1,800	1927	139	10,749
1901	400	2,500	1928	312	27,902
1902	250	3,200	1929	212	14,416
1903	39	468	1930	217	11,700
1904	70	1,052	1931	305	11,979
1905	123	1,849	1932	278	8,142
1906	200	3,320	1933	236	7,255
1907	91	1,647	1934	424	14,884
1908	300	6,255	1935	121	4,153
1909	706	13,414	1936	1,000	40,669
1910	337	8,386	1937	530	23,704
1911	511	14,873	1938	1,069	35,150
1912	603	19,731			
1913	368	17,738	Totals	19,357	$961,521

* Fine ounces, beginning with 1919.

QUICKSILVER

Bibliography: State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII-XXXV (inc.). Bulletins 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

[1] E & M J Metal and Mineral Markets, June 29, 1939.

The production of quicksilver in California during the year 1938 was 12,171 flasks valued at $846,497, compared with the 1937 output of 9,995 flasks worth $837,789. The 1938 output came from 58 properties in 16 counties and distribution was as follows:

County	Flasks	Value
Lake	3,718	$265,430
Napa	794	46,403
San Luis Obispo	1,114	77,938
Santa Barbara	104	7,179
Santa Clara	283	19,883
Sonoma	425	29,641
Contra Costa, Fresno, Inyo, Kern, Kings, Monterey, Orange, San Benito, Solano, Yolo*	5,833	400,023
Totals	12,171	$846,497

* Combined to conceal the output of individual operators.

During 1938 the average for New York monthly quotations [1] was $75.469 per 76-pound flask. The average price for 1937 was $90.180 per flask. The average price for January, 1938, was $79.240 per flask, following which there was a decline in quotations until April when the average price for the month was $71.019. The price then rose to a peak for the year in June of $80.731, declining to October with an average of $73.480, and ending the year with $76.769. The average price received by producers in California during the year 1938 was $69.55 per 76-pound flask, compared with $83.82 in 1937.

The U. S. Bureau of Mines [2] reported the total production of the United States for 1938 at 17,991 flasks valued at $1,357,781. The national production for 1937 was 16,508 flasks valued at $1,488,691.

Furnace plant of Sulphur Bank Quicksilver Mine, Lake County.

Photo by Walter W. Bradley

[1] Engineering and Mining Journal, 1938, Vol. 139.
[2] U. S. Bureau of Mines, Mineral Report 744, May 10, 1939.

California was by a considerable margin the largest producing state, with approximately 67 per cent of the total, other producing states being Oregon, Texas, Arkansas, Washington, Nevada, and Arizona. The 1938 imports of quicksilver amounted to 2,362 flasks valued at $132,610 compared with 18,917 flasks valued at $1,341,928 in 1937, a decrease of 91 per cent in value. Of total imports for 1938, Spain supplied 1,251 flasks and Italy 1,111 flasks.

Open-pit mining at Sulphur Bank Quicksilver Mine, Lake Co.
Photo by Walter W. Bradley

Total Quicksilver Production of California.

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850–1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883–1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850	7,723	$768,052	$99 45	1896	30,765	$1,075,449	$34 96
1851	27,779	1,859,248	66 93	1897	26,691	993,445	37 28
1852	20,000	1,166,600	58 33	1898	31,092	1,188,626	38 23
1853	22,284	1,235,648	55 45	1899	29,454	1,405,045	47 70
1854	30,004	1,663,722	55 45	1900	26,317	1,182,786	44 94
1855	33,000	1,767,150	53 55	1901	26,720	1,285,014	48 46
1856	30,000	1,549,500	51 65	1902	29,552	1,276,524	43 20
1857	28,204	1,374,381	48 73	1903	32,094	1,335,954	42 25
1858	31,000	1,482,730	47 83	1904	[a]28,876	1,086,323	37 62
1859	13,000	820,690	63 13	1905	24,555	886,081	35 94
1860	10,000	535,500	53 55	1906	19,516	712,334	36 50
1861	35,000	1,471,750	42 05	1907	17,379	663,178	38 16
1862	42,000	1,526,700	36 35	1908	18,039	763,520	42 33
1863	40,531	1,705,544	42 08	1909	16,217	773,788	47 71
1864	47,489	2,179,745	45 90	1910	17,665	799,002	45 23
1865	53,000	2,432,700	45 90	1911	19,109	879,205	46 01
1866	46,550	2,473,202	53 13	1912	20,600	866,024	42 04
1867	47,000	2,157,300	45 90	1913	15,661	630,042	40 23
1868	47,728	2,190,715	45 90	1914	11,373	557,846	49 05
1869	33,811	1,551,925	45 90	1915	14,199	1,157,449	81 52
1870	30,077	1,725,818	57 38	1916	21,427	2,003,425	93 50
1871	31,686	1,999,387	63 10	1917	24,382	2,396,466	98 29
1872	31,621	2,084,773	65 93	1918	22,621	2,579,472	114 03
1873	27,642	2,220,482	80 33	1919	15,200	1,353,381	89 04
1874	27,756	2,919,376	105 18	1920	10,278	775,527	75 45
1875	50,250	4,228,538	84 15	1921	3,157	140,666	44 56
1876	75,071	3,303,256	44 00	1922	3,466	191,851	55 35
1877	79,396	2,961,471	37 30	1923	5,458	332,851	60 98
1878	63,880	2,101,652	32 90	1924	7,948	543,080	68 33
1879	73,684	2,194,674	29 85	1925	7,683	621,831	80 81
1880	59,926	1,857,706	31 00	1926	5,892	516,382	87 64
1881	60,851	1,815,185	29 83	1927	6,488	714,418	111 67
1882	52,732	1,488,624	28 23	1928	[b]7,107	844,649	118 84
1883	46,725	1,343,344	28 75	1929	10,152	1,195,705	117 78
1884	31,913	973,347	30 50	1930	11,374	1,255,257	110 36
1885	32,073	986,245	30 75	1931	13,478	1,121,624	83 22
1886	29,981	1,064,326	35 50	1932	5,349	279,780	52 30
1887	33,760	1,430,749	42 38	1933	4,102	229,472	55 94
1888	33,250	1,413,125	42 50	1934	7,946	534,135	67 22
1889	26,464	1,190,880	45 00	1935	9,353	628,590	67 23
1890	22,926	1,203,615	52 50	1936	8,758	671,055	76 62
1891	22,904	1,036,406	45 25	1937	9,995	837,789	83 82
1892	27,993	1,139,595	40 71	1938	12,171	846,497	69 55
1893	30,164	1,108,527	36 75				
1894	30,416	934,000	30 70				
1895	36,104	1,337,131	37 04	Totals	2,405,110	$118,106,572	

[a] Flasks of 75 lbs. from June, 1904; of 76½ lbs. previously.
[b] Flasks of 76 pounds, from January, 1928.

SILVER

Bibliography: State Mineralogist Reports IV, VIII, XII-XXXIV (inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1938 silver output in California totaled 2,590,804 fine ounces valued at $1,674,863, being an increase in both amount and value over the figures of the previous year which were 2,888,265 fine ounces worth $2,234,073. Of the 1938 yield, there was 49,788 fine ounces worth $32,186 from placers. The average price paid for newly mined domestic silver was 64.60¢ per fine ounce in 1938; 77.35¢ in 1937; 77.45¢ in 1936; 71.875¢ in 1935; and 64.6¢ in 1934.

Silver production by counties for 1938 was as follows:

County	Ounces	Value
Alpine	167	$108
Amador	22,536	14,569
Butte	30,425	19,669
Calaveras	17,651	11,411
Del Norte	2	1
El Dorado	8,844	4,717
Fresno	54	35
Humboldt	89	58
Imperial	4,331	2,800
Inyo	41,118	26,581
Kern	1,148,177	742,256
Los Angeles	1,887	1,220
Madera	86	56
Mariposa	7,973	5,154
Merced	5,859	3,788
Mono	220,978	142,854
Monterey	5	3
Napa	148,337	95,895
Nevada	505,156	326,565
Orange	682	441
Placer	43,226	27,944
Plumas	53,927	34,862
Riverside	5,238	3,387
Sacramento	6,236	4,031
San Bernardino	257,370	166,381
San Diego	31	20
San Francisco	5	3
San Joaquin	92	59
Santa Clara	1	1
Santa Cruz	2	1
Shasta	28,771	18,599
Sierra	4,809	3,109
Siskiyou	5,159	3,335
Stanislaus	1,332	861
Trinity	4,628	2,992
Tulare	19	12
Tuolumne	7,029	4,544
Ventura	5	3
Yuba	8,349	5,397
Lassen, Modoc, San Luis Obispo, Tehama*	218	141
Totals	2,590,804	$1,674,863

* Combined in order not to disclose individual mine production.

The following paragraph is quoted from the U. S. Bureau of Mines,[1] chapter on Gold and Silver from Mineral Year Book 1939, by courtesy of Charles White Merrill and H. M. Gaylord.

"The bulk of the silver output of California in 1938 was more localized than that of the gold; the 10 leading properties, listed in the following table produced 82 per cent of the total silver. Newcomers to the list in 1938 were the Standard mine at Bodie (Mono County) and the Idaho Maryland mine at Grass Valley (Nevada County), which displaced on the list the Walker mine (Plumas County) and the Spanish mine (Nevada County). Of the 10 leaders, five produced gold-silver ores, four gold ores, and only one straight silver ore. In addition to the yield by the companies listed, some output of silver was reported from almost every lode and placer mine producing in the State in 1938."

[1] U. S. Bureau of Mines, Mineral Year Book 1939, p. 234.

Ten Leading Silver Producers in California in 1938, in Approximate Order of Output

Mine	District	County	Operator	Source of silver
Cactus Queen	Mojave	Kern	Cactus Mines Co.	Gold-silver ore
Lava Cap	Grass Valley-Nevada City	Nevada	Lava Cap Gold Mining Corp.	Gold ore
Starlight	Mojave	Kern	Lodestar Mining Co.	Gold-silver ore
Kelly	Randsburg	San Bernardino	Frank Royer	Gold-silver ore
Golden Queen	Mojave	Kern	Golden Queen Mining Co.	Gold ore
Grigsby (Palisade)	Calistoga	Napa	Graham Loftus Oil Corp.	Gold-silver ore
Silverado-Kentuck	Mount Patterson	Mono	Sierra Cons. Mines, Inc.	Silver ore
Empire Star	Grass Valley-Nevada City	Nevada	Empire Star Mines Co., Ltd.	Gold ore
Standard	Bodie	Mono	Roseklip Mines Co.	Gold-silver ore
Idaho Maryland	Grass Valley-Nevada City	Nevada	Idaho Maryland Mines Corp.	Gold ore

Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' ($1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880	882,169	$1,014,494	$1 15	1911	1,270,445	$673,336	$0 53
1881	580,091	655,503	1 13	1912	1,300,136	799,584	615
1882	653,569	745,069	1 14	1913	1,378,399	832,553	604
1883	1,129,244	1,253,461	1 11	1914	1,471,859	813,938	553
1884	3,236,987	3,593,056	1 11	1915	1,678,756	851,129	507
1885	1,968,260	2,125,298	1 07	1916	2,564,354	1,687,345	658
1886	1,245,747	1,233,290	99	1917	1,775,431	1,462,955	824
1887	1,262,282	1,237,036	98	1918	1,427,711	1,427,711	1 00
1888	1,314,874	1,235,982	94	1919	1,107,189	1,240,051	1 12
1889	823,917	774,510	94	1920	1,706,327	1,859,896	1 09
1890	820,336	861,353	1 05	1921	3,629,223	3,629,223	1 00
1891	737,224	729,852	99	1922	3,100,065	3,100,065	1 00
1892	358,575	311,960	87	1923	3,559,443	2,918,743	82
1893	415,468	324,065	78	1924	3,555,133	2,381,952	67
1894	229,896	144,834	63	1925	3,054,416	2,119,765	694
1895	463,911	301,542	65	1926	2,022,460	1,262,015	624
1896	326,757	222,195	68	1927	1,620,242	918,677	567
1897	754,648	452,789	60	1928	1,478,711	865,081	585
1898	701,788	414,055	59	1929	1,176,895	627,285	533
1899	855,869	513,521	60	1930	1,622,803	624,779	385
1900	1,168,157	724,257	62	1931	867,818	251,667	290
1901	950,831	570,499	60	1932	493,533	139,176	282
1902	1,163,041	616,412	53	1933	402,591	140,907	350
1903	958,230	517,444	54	1934	844,413	545,883	[a]644
1904	1,441,259	835,929	58	1935	1,191,112	856,112	[a]719
1905	1,076,174	650,009	61	1936	2,103,799	1,629,392	[a]775
1906	1,220,641	817,830	68	1937	2,888,265	2,234,073	[a]774
1907	1,138,856	751,646	66	1938	2,590,804	1,674,863	[a]646
1908	1,647,278	873,057	53				
1909	2,098,253	1,091,092	52				
1910	1,840,085	993,646	54	Totals	86,354,660	$64,153,852	

[a]Average price applied to newly mined within the United States.

TIN

Bibliography: Reports XV, XVII, XVIII, XXV, XXXI, XXXIV, XXXV. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

Total Output of Tin in California

Year	Pounds	Value
1891	125,289	$27,564
1892	126,000	32,400
1928}[a] 1929}	1,200	580
Totals	252,489	$60,544

[a]Annual details concealed under 'Unapportioned.'

TITANIUM

Bibliography: State Mineralogist's Report XXIII, XXXIII.

During 1938 the E. I. du Pont de Memours did exploration work on the deposit of ilmenite in the San Gabriel Mountains in Los Angeles County to determine the extent of the deposit. They also ran an experimental test on the ores for commercializing it in the near future.

In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at $150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Sept. 29, 1938) quotations are: Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at $10 to $12 a ton, all prices Atlantic seaboard.

TUNGSTEN

Bibliography: Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX, XXXIV, XXXV. Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922 inclusive. The material shipped in 1938 was high-grade sorted ore and concentrates, coming from four properties each in Inyo and San Bernardino counties, and a single property each in Mono and Tulare counties. A total of 732 short tons of concentrates averaging 62.988% WO_3 was reported shipped, yielding 46,107 units, or 768 tons recalculated to 60% WO_3 and valued at $786,860 at the mine. The 1938 output showed an increase in both quantity and value as compared with the 1937 which was 611 tons worth $782,187. Quotations in "Metal and Mineral Markets" during 1938 for Chinese wolframite duty paid started the year at $25 a unit WO_3, decreasing in price to the first part of September when it was $17 a unit WO_3, then increased to the end of the year, at $20 a unit WO_3. Domestic scheelite started the year at $22.625 a unit WO_3; in May dropped to $16 to $17 a unit WO_3 and ended the year at from $17 to $19 a unit WO_3. Present (June 29, 1939) prices per unit WO_3 at New York are: Chinese wolframite, duty paid, $18; scheelite $16 to $17.

Imports of foreign tungsten ores and alloys in the United States during 1938, according to the U. S. Bureau of Foreign and Domestic Commerce, totaled 322,085 pounds valued at $138,693, compared with 10,189,625 pounds worth $2,940,038 in 1937. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübernite (manganese tungstate) also occur. The deposits at Atolia were the largest and most productive scheelite deposits known, previous to 1930.[1] (Since passed by Mill City District, Nevada).

Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO_3:

Year	Tons at 60% WO_3	Value	Year	Tons at 60% WO_3	Value
1905	57	$18,800	1924	781	$446,009
1906	485	189,100	1925	573	348,475
1907	287	120,587	1926	441	316,560
1908	105	37,750	1927[a]	389	429,237
1909	577	190,500	1928[a]		
1910	457	208,245	1929	150	106,280
1911	387	127,706	1930[a]	120	82,582
1912	572	206,000	1931[a]		
1913	559	234,673	1932	26	9,509
1914	420	180,575	1933	148	76,605
1915	962	1,005,467	1934	261	224,417
1916	2,270	4,571,521	1935	118	194,542
1917	2,466	3,079,013	1936	236	210,819
1918	1,982	2,832,222	1937	611	782,187
1919	214	219,316	1938	732	786,860
1920					
1923	34	19,126	Totals	16,429	$17,254,579

[a] Annual details concealed under 'Unapportioned.'

VANADIUM

Bibliography: Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present (June 29, 1939) New York quotations for ferrovanadium are $2.70-$2.90 per pound of vanadium f.o.b. works, and vanadium ore 27½¢ per pound V_2O_5 contained.

[1] U. S. G. S. Bull. 652, p. 32.

ZINC

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII, XXXIV. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1938 amounted to 17,554 pounds valued at $843, compared with the 1937 output of 39,643 pounds worth $2,577. The 1938 output came from San Bernardino County.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc[1] at reduction plants in the United States during 1938 amounted to 477,954 short tons valued at $45,884,000, of which 10,334 tons was reduced from foreign ores and 31,613 tons from secondary metal. The 1938 output was a decrease over that of 1937, which was 608,458 short tons worth $79,100.

The average price per pound for zinc in 1938 was 4.8¢ compared with 6.5 in 1937; 5¢ in 1936, 4¢ in 1935; and 4.3¢ in 1934.

Total Zinc Production of California.

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906	206,000	$12,566	1923		
1907	177,759	10,598	1924	3,060,000	$198,900
1908	54,000	3,544	1925	11,546,602	877,542
1909			1926	20,447,559	1,533,568
1910			1927	8,625,004	552,000
1911	2,679,842	152,751	1928		
1912	4,331,391	298,866	1929		
1913	1,157,947	64,845	1931	149,865	5,314
1914	399,641	20,381	1932		
1915	13,043,411	1,617,383	1933	290,222	12,189
1916	15,950,565	2,137,375	1934	721,719	31,034
1917	11,854,804	1,209,190	1935	328,013	14,432
1918	5,565,516	506,466	1936	29,740	1,487
1919	1,384,192	101,046	1937	39,643	2,577
1920	1,188,009	96,229	1938	17,554	843
1921	846,184	42,309			
1922	3,034,430	172,963	Totals	107,129,660	$9,676,398

[1] U. S. Bureau of Mines, Mineral Market Report 720, March 30, 1939.

CHAPTER FOUR

STRUCTURAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXV (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1938 was valued at $30,880,924 as compared with a total of $37,976,626 for the year 1937. Materials grouped under this classification showing increased values in 1938 were bituminous rock and lime.

In 1938 all counties contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1937-1938, with increases or decreases in each instance:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		$3,083,902		$2,594,546	$489,356—
Cement	12,072,062 bbls.	16,546,229	10,561,037 bbls.	15,502,574	1,043,655—
Granite		207,738		131,386	76,352—
Lime	69,532 tons	681,277	70,078 tons	683,403	2,126+
Marble[a]		23,667		6,015	17,652—
Sandstone		15,680		9,384	6,296—
Slate		32,572	6,871 tons	30,281	2,291—
Stone, miscellaneous		16,917,683		11,734,038	5,183,645—
Unapportioned		[b]467,876		[c]189,797	278,579—
Total values		$37,976,624		$30,880,924	
Net decrease					$7,095,700

[a] Includes onyx and travertine.
[b] Includes bituminous rock, magnesite, tube-mill pebbles.
[c] Includes bituminous rock, magnesite, paving blocks, serpentine, tube-mill pebbles.

ASPHALT

Bibliography: State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself.

However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

BITUMINOUS ROCK

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1938 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1936 and 1937 yield was 36,128 short tons valued at $139,242. The 1938 output showed an increase in both amount and value over that of 1937.

Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	$160,000	1914	66,119	$166,618
1888	50,000	257,000	1915	17,789	61,468
1889	40,000	170,000	1916	19,449	66,561
1890	40,000	170,000	1917	5,590	18,580
1891	39,962	154,164	1918	2,561	9,067
1892	24,000	72,000	1919	4,614	18,537
1893	32,000	192,036	1920	5,450	27,825
1894	31,214	115,193	1921	8,298	43,192
1895	38,921	121,586	1922	4,624	13,570
1896	49,456	122,500	1923	2,945	11,780
1897	45,470	128,173	1924	6,040	14,922
1898	46,836	137,575	1925	2,681	10,724
1899	40,321	116,097	1926	3,863	21,577
1900	25,306	71,495	1927	3,515	17,704
1901	24,052	66,354	1928	4,966	33,832
1902	33,490	43,411	1929	3,320	14,360
1903	21,944	53,106	1930	8,525	36,075
1904	45,280	175,680	1931		
1905	24,753	60,436	1932	*	
1906	16,077	45,204	1933	23,653	109,140
1907	24,122	72,835	1934	*	
1908	30,718	109,818	1935	36,793	130,301
1909	34,123	116,436	1936	*	
1910	87,547	165,711	1937	41,681	133,344
1911	75,125	117,279	1938	*	
1912	44,073	87,467		36,128	139,242
1913	37,541	78,479	Totals	1,346,935	$4,278,454

* Annual details concealed under 'Unapportioned.'

BRICK AND HOLLOW TILE

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII-XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this tile to residence construction as well as to other structures has grown, though their total output for 1938 showed a decrease in value and tonnage as compared with the 1937 production.

The 1938 output of all kinds of brick in California showed a decrease in value of 18 per cent and a decrease in amount of 12 per cent as compared with that of 1937. The 1938 production consisted of 107,607 M. of common brick valued at $1,148,756; 17,944 M. of fire brick valued at $1,075,774; 3,722 M. of glazed, pressed fancy and vitrified paving-brick valued at $146,289; and 16,592 tons of hollow building tile valued at $223,827; which gave a total value for the year for brick and hollow building-tile of $2,594,546. The 1937 output had a total value of $3,083,902.

Los Angeles County had the largest production of brick and hollow building-tile in 1938 with 16 companies producing 54,152 M. of common brick worth $571,095; 8,519 M. of Fire brick worth $600,829; 784 M. of fancy, glazed and pressed brick worth $34,168; and 3,022 tons of hollow building-tile worth $31,141. Contra Costa County with three plants operating had a production of brick and hollow building-tile valued at $483,961. Santa Clara with three plants, output of brick was valued at $236,295. There were two operating plants each in Alameda, Orange, Kern, Sacramento, San Diego, San Joaquin, and Santa Barbara counties and one each in Amador, Fresno, Humboldt, Placer, Riverside, San Luis Obispo, San Bernardino, and Tulare counties. Included in the output of Alameda County was some face hollow building-tile.

Brick and Hollow-Tile Production of California, by Years.

Record of brick production in the state has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893	103,900		$801,750
1894	81,675		457,125
1895	131,772		672,360
1896	24,000		524,740
1897	97,468		563,240
1898	100,102		571,362
1899	125,950		754,730
1900	137,191		905,210
1901	130,766		860,488
1902	169,851		1,306,215
1903	214,403		1,999,546
1904	281,750		1,994,740
1905	286,618		2,273,786
1906	277,762		2,538,848
1907	362,167		3,438,951
1908	332,872		2,506,495
1909	333,846		3,059,929
1910	340,883		2,934,731
1911	327,474		2,638,121
1912	337,233		2,940,290
1913	358,754		2,915,350
1914	270,791		2,288,227
1915	180,538		1,678,756
1916	206,960		2,096,570
1917	192,269	29,348	2,532,721
1918	136,374	34,818	2,363,481
1919	156,328	36,026	3,087,067
1920	245,842	99,208	5,704,393
1921	238,022	67,100	5,570,875
1922	374,853	105,909	7,994,991
1923	397,754	122,534	9,738,082
1924	456,716	114,469	9,137,908
1925	361,094	105,491	7,503,976
1926	388,048	90,332	7,026,124
1927	374,111	75,116	6,516,077
1928	272,443	66,277	5,694,770
1929	327,011	66,713	5,607,410
1930	267,019	68,047	4,205,460
1931	151,545	51,988	2,560,415
1932	90,683	27,098	1,605,086
1933	76,905	25,814	1,520,481
1934	66,738	17,534	1,644,661
1935	76,521	21,309	1,855,343
1936	131,667	16,081	2,240,905
1937	148,833	17,521	3,083,902
1938	129,273	16,592	2,594,546
Totals	10,574,775	1,275,325	$142,610,234

CEMENT

Bibliography: State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.), XXXII. Bulletin 38.

During 1938 there was a production of 10,561,037 barrels of cement in California, valued at $15,502,574 f.o.b. plant, of which 4,015,467 barrels came from southern California plants, and 6,545,570 barrels came from northern California plants. The 1938 output was a decrease from that of 1937, which was 12,072,037 barrels worth $16,546,229.

Shipments during 1938 were made from ten plants in nine counties to the extent 10,594,706 barrels valued at $15,567.295, as compared with 11,721,818 barrels worth $16,868,379. There were five plants in operation in northern California—one each in Calaveras, Contra Costa,

Merced, San Mateo, Santa Cruz counties, which shipped 4,006,067 barrels of cement; and five plants in southern California, two in San Bernardino County, and one each in Kern, Los Angeles [1] and Riverside counties, which shipped 6,588,639 barrels of cement. There were 1,993 men employed in the above plants during the year 1938.

Riverside Portland Cement Co. plant at Crestmore, Riverside County.
Photo by Walter W. Bradley

Cement Production of California, by Years.

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then $4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to $2.50 a barrel, about the same as it is today." [2]

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

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[1] The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

[2] Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	$15,000	1916	5,299,507	$6,210,293
1892	5,000	15,000	1917	5,790,734	7,544,282
1893			1918	4,772,921	7,969,909
1894	8,000	21,600	1919	4,645,289	8,591,990
1895	16,383	32,556	1920	6,709,160	14,962,945
1896	9,500	28,250	1921	7,404,221	18,072,120
1897	18,000	66,000	1922	8,962,135	16,524,956
1898	50,000	150,000	1923	10,825,405	25,999,203
1899	60,000	180,000	1924	11,655,131	23,225,850
1900	52,000	121,000	1925	13,296,630	25,043,335
1901	71,800	159,842	1926	13,797,173	25,269,678
1902	171,000	423,690	1927	14,661,783	26,474,925
1903	640,868	968,727	1928	13,625,231	24,463,287
1904	969,538	1,539,807	1929	12,794,729	21,038,565
1905	1,265,553	1,791,916	1930	9,831,938	14,575,731
1906	1,286,000	1,941,250	1931	7,693,712	11,510,655
1907	1,613,563	2,585,577	1932	5,657,549	7,967,107
1908	1,629,615	2,359,692	1933	7,284,031	10,331,395
1909	3,779,205	4,969,437	1934	8,936,985	12,445,616
1910	5,453,193	7,485,715	1935	8,086,292	10,120,721
1911	6,371,369	9,085,625	1936	13,300,188	18,314,589
1912	6,198,634	6,974,661	1937	12,072,062	16,546,229
1913	6,167,806	7,743,024	1938	10,561,037	15 502,574
1914	5,109,218	6,558,148			
1915	4,918,275	6,044,950	Totals	263,442,463	$429,066,432

GRANITE

Bibliography: State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI, XXXV. Bulletin 38.

The 1938 output of granite in California amounted to 54,890 cu. ft. of building stone valued at $66,391; 16,044 cu. ft. of monumental stone valued at $45,933; 12,037 linear ft. of curbing valued at $8,384; and 13,876 cu. ft. of unclassified material including a small amount of tuff and volcanic rock which was used as building stone, and for flagstone, having a value of $10,678; giving a total value for the year's yield at $131,386. This was a decrease from the 1937 total value which was $207,738. The 1938 output came from 21 quarries in 16 counties, of which there were two each in Fresno, Nevada, Placer, San Diego, and Sonoma counties and one each in Lassen, Los Angeles, Mariposa, Plumas, Riverside, Sacramento, San Bernardino, Santa Barbara, Shasta, Tuolumne, and Ventura counties.

The material from Los Angeles was a mica schist; that from Sonoma County a tuff and that from Shasta and Ventura counties a volcanic rock.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

Varieties.

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notable at

Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also similar 'black granite' in Tulare County, near Success.

Granite Production of California, by Years.

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887	$150,000	1914	$628,786
1888	57,000	1915	227,928
1889	1,329,018	1916	535,339
1890	1,200,000	1917	221,997
1891	1,300,000	1918	139,861
1892	1,000,000	1919	220,743
1893	531,322	1920	495,732
1894	228,816	1921	725,901
1895	224,329	1922	676,643
1896	201,004	1923	760,081
1897	188,024	1924	1,211,046
1898	147,732	1925	1,853,859
1899	141,070	1926	655,332
1900	295,772	1927	1,398,443
1901	519,285	1928	763,996
1902	255,239	1929	1,169,271
1903	678,670	1930	855,477
1904	467,472	1931	636,741
1905	353,837	1932	398,676
1906	344,083	1933	183,706
1907	373,376	1934	249,083
1908	512,923	1935	339,917
1909	376,834	1936	244,243
1910	417,898	1937	207,738
1911	355,742	1938	131,386
1912	362,975		
1913	981,277	Total	$27,925,623

LIME

Bibliography: Reports XIV, XV, XVII-XXIX (inc.), XXXIII, Bulletin 38.

In California during 1938 there was an output of lime amounting to 70,578 short tons valued at $683,403, coming from two plants each in El Dorado and San Bernardino counties and one each in Alameda, Santa Cruz and Tulare counties. The above figures showed an increase in both amount and value over those of 1937 which were 69,532 tons worth $681,277.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not

separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

Lime Production of California, by Years.

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels,' as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

Year	Tons	Value	Year	Tons	Value
1894	37,350	$318,700	1918	43,684	$461,315
1895	39,776	386,094	1919	42,070	552,043
1896	30,275	261,505	1920	46,314	557,232
1897	28,780	252,900	1921	46,353	610,619
1898	29,786	254,010	1922	57,875	671,747
1899	29,985	314,575	1923	70,894	788,834
1900	31,252	283,699	1924	62,029	703,355
1901	31,738	334,688	1925	61,922	685,528
1902	44,866	369,616	1926	63,568	670,837
1903	49,659	418,280	1927	60,498	631,497
1904	57,945	571,749	1928	56,616	547,919
1905	61,700	555,322	1929	42,834	417,101
1906	68,927	763,060	1930	47,662	452,084
1907	68,422	756,376	1931	36,189	360,523
1908	39,639	379,243	1932	27,510	254,223
1909	52,075	577,824	1933	33,425	271,619
1910	47,951	477,683	1934	32,500	309,765
1911	42,959	390,988	1935	59,731	573,212
1912	52,212	464,440	1936	64,275	633,678
1913	61,344	528,547	1937	69,532	681,277
1914	43,996	378,663	1938	70,578	683,403
1915	35,653	286,304			
1916	49,364	390,475			
1917	50,073	311,380	Totals	2,181,886	$21,543,932

MAGNESITE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1938 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of this single operator. Practically all was shipped in the calcined form.

The output for 1938 showed a decrease in both quantity and value from that of 1937. The 1936-1937 production showed a total of 94,491 short tons of crude magnesite valued at $734,443, of which only a small amount was sold as such. Most of this material was calcined. The operators' reports showed that a total of 39,364 short tons of calcined material valued at $1,016,843 rail-shipping point, was made during 1936-1937 and was both dead-burned and periclase for refractories, and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported in 1938 was $7.43 per ton, compared with $8.25 per ton in 1937, $7.25 per ton in 1936, $6.70 per ton in 1935, $6.50 per ton in 1934, $5.60 per ton in 1933, and $10.00 per ton in 1932.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property. Beginning in 1938, a portion of the market for calcined magnesite is being supplied by magnesium oxide produced from salt-works bitterns at a plant at Newark, Alameda County, on San Francisco Bay. The figures for this tonnage are included under those for magnesium salts in the Salines chapter.

Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick ¾¢ per lb., and 10 per cent ad valorem. The figures of imports for 1938, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 26,479 short tons valued at $376,397 as compared with 58,853 tons worth $857,780 in 1937.

Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,[1] southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887	600	$9,000	1914	11,438	$114,380
1888	600	9,000	1915	30,271	283,461
1889	600	9,000	1916	154,052	1,311,893
1890	600	9,000	1917	209,648	1,976,227
1891	1,500	15,000	1918	83,974	803,492
1892	1,500	15,000	1919	44,696	452,094
1893	1,093	10,930	1920	83,695	1,033,491
1894	1,440	10,240	1921	47,837	511,102
1895	2,200	17,000	1922	55,637	594,665
1896	1,500	11,000	1923	73,963	946,643
1897	1,143	13,671	1924	67,236	900,183
1898	1,263	19,075	1925	64,623	872,944
1899	1,280	18,480	1926	50,915	587,642
1900	2,252	19,333	1927	46,093	577,887
1901	4,726	43,057	1928	45,645	501,590
1902	2,830	20,655	1929	47,269	488,014
1903	1,361	20,515	1930	38,681	388,472
1904	2,850	9,298	1931	21,576	182,283
1905	3,933	16,221	1932–1933	40,303	282,325
1906	4,032	40,320			
1907	6,405	57,720	1934–1935	62,509	413,228
1908	10,582	80,822			
1909	7,942	62,588	1936–1937	94,491	734,443
1910	16,570	113,887			
1911	8,858	67,430	1938	*	*
1912	10,512	105,120			
1913	9,632	77,056	Totals	1,482,806	$14,856,877

* Combined under 'Unapportioned.'

MARBLE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.), XXXV. Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1938 production of marble in California was valued at $6,015 (including some onyx and travertine from San Bernardino County, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles, San Luis Obispo, and Santa Barbara counties). The 1938 output showed a decrease in value from that of 1937 which was $23,667.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

[1] See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887	----------	$5,000	1914	25,436	$48,832
1888	----------	5,000	1915	22,186	41,518
1889	----------	87,030	1916	25,954	50,280
1890	----------	80,000	1917	24,755	62,950
1891	----------	100,000	1918	[a]17,428	49,898
1892	----------	115,000	1919	25,020	74,482
1893	----------	40,000	1920	[b]29,531	92,899
1894	38,441	98,326	1921	30,232	98,395
1895	14,864	56,566	1922	38,321	127,792
1896	7,889	32,415	1923	28,015	124,919
1897	4,102	7,280	1924	[b]61,579	140,253
1898	8,050	23,594	1925	35,664	116,105
1899	9,682	10,550	1926	34,806	119,999
1900	4,103	5,891	1927	[b]42,308	103,689
1901	2,945	4,630	1928	[b]34,324	82,190
1902	19,305	37,616	1929	[b]72,881	93,661
1903	84,624	97,354	1930	[b]65,775	82,194
1904	55,401	94,208	1931	[b]37,776	81,760
1905	73,303	129,450	1932	[b]25,506	42,505
1906	31,400	75,800	1933	[b]9,039	23,178
1907	37,512	118,066	1934	[b]7,185	10,759
1908	18,653	47,665	1935	(b)	9,884
1909	79,600	238,400	1936	(b)	23,011
1910	18,960	50,200	1937	(b)	23,667
1911	20,201	54,103	1938	(b)	6,015
1912	27,820	74,120			
1913	41,654	113,282	Total	----------	$3,532,381

[a] Includes onyx and serpentine.
[b] Includes onyx and travertine.

ONYX and TRAVERTINE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI, XXXIV. Bulletin 38.

Onyx and travertine are known to exist in anumber of places in California, but there has been only a small and irregular production since the year 1896. In 1938 there were two producers of onyx in San Bernardino County. The 1938 output showed a decrease in both quantity and value from that of 1937, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen sets, and other ornamental purposes.

Onyx Production of California, by Years.

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1924	*
1888	$900	1925	$16,120
1889	900	1926	7,575
1890	900	1927	*
1891	1,500	1928	*
1892	2,400	1929	*
1893	1,800	1930	*
1894	27,000	1931	*
1895	20,000	1932	*
1896	12,000	1933	*
1918	24,000	1934	*
1919	*	1935	*
1920	----------	1936	*
1921	1,294	1937	*
1922	3,320	1938	*
1923	2,510		
		Total value	$122,219

* See under Marble.

SANDSTONE

Bibliography: State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1938 a total of 43,107 cu. ft. of sandstone valued at $9,384 was quarried in California, and came from two properties in Monterey County and one each in Los Angeles, San Luis Obispo, and Shasta counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887	----------	$175,000	1914	111,691	$45,322
1888	----------	150,000	1915	63,350	8,438
1889	----------	175,598	1916	17,270	10,271
1890	----------	100,000	1917	31,090	7,074
1891	----------	100,000	1918	900	400
1892	----------	50,000	1919	5,400	3,720
1893	----------	26,314	1920	10,500	2,300
1894	----------	113,592	1921	10,150	2,112
1895	----------	35,373	1922	900	1,100
1896	----------	28,379	1923	7,000	13,000
1897	----------	24,086	1924	6,700	3,600
1898	----------	46,384	1925	14,704	14,362
1899	56,264	103,384	1926	34,100	17,500
1900	378,468	254,140	1927	222,900	205,400
1901	266,741	192,132	1928	134,100	43,250
1902	212,123	142,506	1929	177,655	49,881
1903	253,002	585,309	1930	160,701	56,404
1904	363,487	567,181	1931	110,244	30,960
1905	302,813	483,268	1932	41,793	13,286
1906	182,076	164,068	1933	25,980	10,888
1907	159,573	148,148	1934	21,738	14,245
1908	93,301	55,151	1935	38,426	9,268
1909	79,240	37,032	1936	24,705	9,180
1910	165,971	80,443	1937	73,190	15,680
1911	255,313	127,314	1938	43,107	9,384
1912	68,487	22,574			
1913	62,227	27,870	Total value	----------	$4,612,171

SERPENTINE

Bibliography: State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

The production of serpentine prior to 1919 was 'verde antique' which is used as an ornamental stone and often classed as a marble. In recent years experimental tests have proved several possible commercial applications to which this mineral might be put such as an admix in cement, in the manufacture of magnesium chemicals, in terrazzo, as a substitute for soapstone, and as a filler. During 1938 there was a small shipment of serpentine from one property in San Bernardino County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of an individual.

Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1895	4,000	$4,000	1905		
1896	1,500	6,000	1906	847	$1,694
1897	2,500	2,500	1907	1,000	3,000
1898	750	3,000	1917	[a]	[a]
1899	500	2,000	1918	[b]	[b]
1900	350	2,000	1919		
1901	89	890	1938	[a]	[a]
1902	512	5,065			
1903	99	800			
1904	200	2,310	Totals	12,347	$33,259

[a] Under 'Unapportioned.'
[b] See under Marble.

SLATE

Bibliography: State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1938 amounted to 6,871 short tons at a total value of $30,281 f.o.b. quarry and came from properties in El Dorado, Los Angeles, Inyo, and Tuolumne counties.

The 1938 figures showed a decrease in value from those of 1937 which were 5,036 tons and 440 squares having a total value of $32,572. Practically all the slate was crushed and used for roofing granules. The slate same from Los Angeles County and was sold as flagstone.

Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889	4,500	$18,089	1911		
1890	4,000	24,000	1915	1,000	$5,000
1891	4,000	24,000	1916		
1892	3,500	21,000	1920	8	80
1893	3,000	21,000	1921		
1894	1,800	11,700	1922	200	2,400
1895	1,350	9,450	1923		
1896	500	2,500	1926	[a]	7,371
1897	400	2,800	1927	[b]2,686	17,960
1898	400	2,800	1928	[b]4,075	31,263
1899	810	5,900	1929		
1900	3,500	26,250	1930 *	[b]8,220	71,347
1901	5,100	38,250	1931		
1902	4,000	30,000	1932 *	[b]8,234	55,182
1903	10,000	70,000	1933	[b]5,343	31,958
1904	6,000	50,000	1934	[b]5,065	24,245
1905	4,000	40,000	1935	[a]	40,912
1906	10,000	100,000	1936	[a]	49,818
1907	7,000	60,000	1937	[a]	32,572
1908	6,000	60,000	1938	[b]6,871	30,281
1909	6,961	45,660			
1910	1,000	8,000	Total		$1,076,788

* Annual details concealed under 'Unapportioned.'
[a] Quantity not shown as both 'squares' and 'tons' included.
[b] Tons.

MISCELLANEOUS STONE

Bibliography: State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII, XXXV. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1938 the output of sand and gravel and that of crushed rock showed an increase in both amount and value over that of the previous year. There was a total value of $11,734,038 for 'miscellaneous stone' during 1938, compared with $16,917,683 for 1937. As in the past, Los Angeles County led in the annual output of these products, its 1938 yield being worth $3,836,394; Alameda County second with an output worth $1,141,554; Contra Costa County with an output worth $433,644; followed in turn by Napa, Sacramento, Riverside, Stanislaus, San Diego, San Bernardino, Butte.

Paving Blocks.

There was a small output of paving blocks in California during 1938 coming from a single property each in Riverside and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	$350,000	1913	6,364	$363,505
1888	10,500	367,500	1914	6,053	270,598
1889	7,303	297,236	1915	3,285	171,092
1890	7,000	245,000	1916	1,322	54,362
1891	5,000	150,000	1917	938	38,567
1892	*3,000	96,000	1918	372	17,000
1893	2,770	96,950	1919	27	1,350
1894	2,517	66,981	1920	63	3,155
1895	2,332	73,338	1921	4	280
1896	4,161	77,584	1922	72	3,924
1897	1,711	35,235	1923	15	880
1898	1,144	21,725	1924	11	935
1899	305	7,861	1925	27	1,350
1900	1,192	23,775	1926		
1901	1,920	41,075	1927	41	2,057
1902	3,502	112,437	1928	25	1,658
1903	4,854	134,642	1929		
1904	3,977	161,752	1930		
1905	3,408	134,347	1931	66	5,900
1906	4,203	173,432	1932		
1907	4,604	199,347	1934	2	75
1908	7,660	334,780	1935		
1909	4,503	199,803	1938	[a]	[a]
1910	4,434	198,916			
1911	4,141	210,819			
1912	11,018	578,355	Totals	135,840	$5,325,578

* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

[a] Annual details concealed under 'Unapportioned.'

Grinding-Mill Pebbles.

The 1938 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in Siskiyou County.

The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value	Year	Tons	Value
1915	340	$2,810	1928	372	$2,408
1916	20,232	107,567	1929		
1917	21,450	90,538	1930 *	166	1,225
1918	8,628	61,268	1931		
1919	2,607	19,272	1932 *	25	211
1920	2,104	17,988	1933		
1921	247	1,418	1934 *	300	3,018
1922	1,571	7,628	1935		
1923	2,650	14,936	1936 *	961	8,356
1924	434	2,969	1937		
1925	215	1,385	1938 *	960	4,800
1926	102	612			
1927	288	1,800	Totals	63,652	$280,209

* Annual details concealed under 'Unapportioned.'

Sand and Gravel.

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

The distribution of the 1938 output of sand and gravel by counties is given in the following table:

County	Tons	Value
Alameda[a]	1,452,139	$886,193
Alpine	13,965	10,980
Amador	17,055	6,027
Butte	267,616	138,101
Calaveras	35,151	21,258
Colusa	2,953	1,234
Contra Costa[a]	112,715	75,363
Del Norte	11,182	3,296
Fresno	181,497	116,102
Glenn	180,367	58,725
Humboldt	228,470	66,889
Imperial	71,877	51,404
Inyo	30,383	28,248
Kern	337,687	210,750
Lake	7,116	2,898
Lassen	62,716	28,118
Los Angeles	5,308,491	2,610,451
Madera	6,125	2,875
Marin	18,450	18,450
Mariposa	3,849	4,884
Mendocino	114,535	42,678
Merced	71,978	26,441
Modoc	3,700	2,800
Mono	6,774	4,121
Monterey[a, b, c]	116,013	151,888
Napa	25,250	12,000
Nevada	53,929	36,877
Orange	293,319	192,444
Placer	87,330	48,458
Plumas	26,030	13,860
Riverside[a, b]	226,784	115,404
Sacramento[a]	402,378	234,515
San Bernardino	357,204	195,826
San Diego[a, b, c]	282,968	227,738
San Joaquin	348,019	165,658
San Luis Obispo[a]	45,241	19,000
Santa Clara	137,706	54,706
Santa Cruz	166,082	89,739
Shasta	69,267	44,814
Sierra	1,420	710
Siskiyou	21,295	10,654
Stanislaus	135,315	75,168
Sutter	135,100	20,265
Tehama	8,056	3,419
Trinity	12,074	5,791
Tulare	149,710	80,740
Tuolumne	18,567	16,440
Ventura[a]	576,233	231,483
Yolo	119,393	44,598
Yuba	144,915	163,628
El Dorado, Kings, San Benito, San Francisco, San Mateo[a], Santa Barbara, Solano, Sonoma*	477,568	283,268
Totals	12,983,957	$6,957,377

* Combined to conceal the output of individual operators in each.
[a] Includes molding sand.
[b] Includes blast sand.
[c] Includes filter sand.

Included in the above is a total of 32,691 tons of molding sand valued at $90,288 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1938 yield showed a decrease compared with 1937 which was 58,489 tons worth $131,906.

Crushed Rock Production, by Counties, for 1938

County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda	223,209	$151,370	3,400	$1,700	89,114	$69,720	[e]58,612	32,571	374,335	$255,361
Butte	111,873	94,770			*	*	*	*	111,873	94,770
Calaveras	14,640	14,078					10,819	3,655	25,459	17,773
Contra Costa	223,975	177,847	13,697	22,962	*	*	153,271	134,500	390,943	335,309
Del Norte	20,630	12,000							20,630	12,000
El Dorado	35,278	59,434			*	*			35,278	59,434
Humboldt							13,631	6,816	13,631	6,816
Imperial	3,676	9,467							3,676	9,467
Lassen	54,200	31,000							54,200	31,000
Los Angeles	[b]121,184	120,418	576,613	607,694	385,509	242,245	[b]463,789	255,586	1,547,095	1,225,943
Mariposa	174,799	225,494	43,255	50,512	760	1,140			218,814	277,146
Mendocino	4,800	3,600			25	50			4,825	3,650
Merced	81,900	111,996			*	*			81,900	111,996
Plumas			18,305	13,299					18,305	13,299
Riverside	58,186	32,218	56,817	47,378			149,575	124,796	264,578	204,392
Sacramento	*	*	10,918	7,067	22,318	20,399	77,562	73,562	110,798	*
San Bernardino	37,257	37,552					[a]49,656	46,140	86,913	83,692
San Mateo	14,989	9,622			149	182			15,138	9,804
Santa Clara	*	*	*	*	*	*	196,459	135,565	196,459	135,565
Shasta	[d]63,555	35,706							63,555	35,706
Siskiyou	[e]272,995	105,678							272,995	105,678
Sonoma	42,733	18,770							42,733	18,770
Trinity	1,000	1,000	29,665	29,665					30,665	30,665
Tuolumne	72,959	62,580	3,802	3,327	*	*			76,761	65,907
Fresno, Inyo, Marin, Modoc, Napa, Nevada, Sacramento[b], San Benito, Santa Barbara, Santa Clara, Stanislaus, Tehama, Tulare, Ventura*	832,773	541,620							832,773	541,620
Marin, Napa, Nevada, Placer, San Benito, San Luis Obispo, Santa Clara, Santa Cruz*			347,085	313,543					347,085	320,610
Butte, Contra Costa, El Dorado, Fresno, Marin, Merced, Napa, Nevada, Orange, San Diego, San Francisco, Santa Clara, Santa Cruz, Stanislaus, Tuolumne, Ventura*					468,700	17,689			468,700	438,088
Butte, Fresno, Inyo[a], Kern, Marin, Napa, Nevada, San Diego, San Francisco, San Joaquin, Santa Cruz, Solano, Stanislaus, Tulare*							357,603	258,688	357,603	332,240
Totals	2,466,611	$1,856,220	1,103,557	$1,097,147	966,575	$751,425	1,530,977	$1,071,869	6,067,720	$4,776,661

* Combined to conceal output of a single operator in each.
[a] Includes granules for roofing and terrazzo.
[b] Includes decomposed granite.
[d] Includes slag.
[e] Includes volcanic cinder.

Crushed Rock.

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

Miscellaneous Stone Production of California, by Years.

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,000	$456,075	1917	8,069,271	3,505,662
1894	661,900	664,838	1918	6,641,144	3,325,889
1895	1,254,688	1,095,939	1919	6,919,188	3,678,322
1896	960,619	839,884	1920	9,792,122	6,782,414
1897	821,123	600,112	1921	10,914,145	7,834,640
1898	1,177,365	814,477	1922	13,049,644	10,366,231
1899	964,898	786,892	1923	19,840,301	15,379,838
1900	789,287	561,642	1924	21,451,129	15,962,476
1901	530,396	641,037	1925	23,819,137	17,407,113
1902	2,056,015	1,249,529	1926	24,987,606	19,859,261
1903	2,215,625	1,673,591	1927	25,126,691	18,912,994
1904	2,296,898	1,641,877	1928	27,471,794	17,328,044
1905	2,624,257	1,716,770	1929	27,104,618	17,840,159
1906	1,555,372	1,418,406	1930	23,514,168	16,430,027
1907	2,288,888	1,915,015	1931	15,848,313	11,848,531
1908	3,998,945	3,241,774	1932	11,361,564	7,183,643
1909	5,531,561	2,708,326	1933	11,181,156	6,871,581
1910	5,827,828	2,777,690	1934	16,148,275	7,131,330
1911	6,487,223	3,610,357	1935	9,041,876	5,571,041
1912	8,044,937	4,532,598	1936	28,528,079	16,578,238
1913	9,817,616	4,823,056	1937	28,254,740	16,917,683
1914	9,288,397	3,960,973	1938	19,051,677	11,734,038
1915	10,879,497	4,609,278			
1916	9,951,089	4,009,590	Totals	458,512,162	$308,798,881

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

CHAPTER FIVE

INDUSTRIAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXV (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have clearly a defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group, as a whole, showed a decrease in total value from $6,154,918 in 1937 to $5,027,093 in 1938.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1937 and 1938.

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite	8,425 tons	$140,261	9,374 tons	$113,164	$27,097—
Clay (pottery)	354,669 tons	705,200	304,564 tons	582,608	122,592—
Dolomite	12,371 tons	24,603	----------	*	*—
Feldspar	2,686 tons	10,930	----------	*	*—
Gems	----------	2,075	----------	4,575	2,500+
Gypsum	186,160 tons	384,431	161,996 tons	327,821	56,610—
Limestone	351,755 tons	830,562	302,655 tons	729,149	101,413—
Mineral water	18,309,729 gals.	1,130,810	26,900,959 gals.	853,998	276,812—
Pumice and volcanic ash	10,392 tons	79,005	18,783 tons	105,207	26,202+
Silica (glass, sand, quartz)	84,313 tons	348,987	63,167 tons	278,676	70,311—
Talc and soapstone	29,657 tons	347,772	28,346 tons	290,810	56,962—
Unapportioned	----------	[a]2,155,282	----------	[b]1,741,085	414,197—
Total values	----------	$6,159,918	----------	$5,027,093	----------
Net decrease	----------	----------	----------	----------	$1,132,825

* Included 'Unapportioned.'

[a] Includes barite, carbon dioxide, diatomite, fluorite, mica, mineral paint, pyrite, sillimanite-andalusite-kyanite group, sulphur, zircon.

[b] Includes barite, carbon dioxide, diatomite, dolomite, feldspar, garnets, lithia, mica, pyrite, sillimanite-andalusite-kyanite group, sulphur, calcium silicate.

ASBESTOS

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII, XXXIV. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1937 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887	30	$1,800	1912	90	$2,700
1888	30	1,800	1913	47	1,175
1889	30	1,800	1914	51	1,530
1890	71	4,260	1915	143	2,860
1891	66	3,960	1916	145	2,380
1892	30	1,830	1917	136	10,225
1893	50	2,500	1918	229	9,903
1894	50	2,250	1919	131	6,240
1895	25	1,000	1920		
1896			1921	410	19,275
1897			1922	50	1,800
1898	10	200	1923	20	200
1899	30	750	1924	70	4,750
1900	50	1,250	1925	25	1,650
1901	110	4,400	1926		
1902			1927	13	1,160
1903			1928		
1904	10	162	1929	219	6,175
1905	112	2,625	1930		
1906	70	3,500	1931		
1907	70	3,500	1932	309	3,274
1908	70	6,100	1934		
1909	65	6,500	1935		
1910	200	20,000	1936		
1911	125	500	Totals	3,392	$145,984

* Annual details concealed under 'Unapportioned.'

BARITE

Bibliography: State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.), XXXIV. Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1938 the barite produced in California came from two properties in Mariposa County, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

Commercial production of barite in California for 1936 and 1937 amounted to a total of 41,882 short tons valued at $245,393 f.o.b. rail shipping point.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of $4 per ton; ground or otherwise manufactured, of $7.50 per ton.

Present quotations for barite (93% $BaSO_4$) vary from $6.50 to $7.50 per tons, crude, f.o.b. rail-shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, $BaCO_3$). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910	860	$5,640	1925		
1911	309	2,207	1926	4,978	$38,165
1912	564	2,812	1927	17,993	90,617
1913	1,600	3,680	1928	13,406	55,888
1914	2,000	3,000	1929	26,796	168,829
1915	410	620	1930	19,783	133,107
1916	1,606	5,516	1931	27,832	156,647
1917	4,420	25,633	1932	8,507	49,409
1918	100	1,500	1933	8,405	49,595
1919	1,501	18,065	1934	21,769	125,514
1920	3,029	20,795	1935	22,979	133,810
1921	901	4,809	1936	41,882	245,392
1922	3,370	18,925	1937	*	*
1923	2,925	16,058	1938		
1924			Totals	237,925	$1,376,243

* Annual details concealed under 'Unapportioned.'

BENTONITE (Fuller's Earth)

Bibliography: State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.), XXXIV. Bulletins 83, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1938 there was produced and shipped in California 9,374 tons of bentonite (fuller's earth) valued at $113,164, coming from eight properties—six in San Bernardino and one each in Inyo and Los Angeles counties. The 1938 output, as compared with that of 1937 showed a decrease in amount and value, and was 8,425 tons worth $140,261.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is

employed in uses that can not be classed as fuller's earth and therefore had been classified in these reports under pottery clay. This was somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthly, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of $1.50 a ton on foreign produced imported fuller's earth.

Bentonite Production of California, by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899	620	$12,400	1920	600	$6,000
1900	500	3,750	1921	1,185	8,295
1901	1,000	19,500	1922	6,606	48,756
1902	987	19,246	1923	3,650	55,125
1903	250	4,750	1924	5,290	67,295
1904	500	9,500	1925	5,280	91,842
1905	1,344	38,000	1926	23,552	250,192
1906	440	10,500	1927	13,018	154,764
1907	100	1,000	1928	53,232	501,743
1908	50	1,000	1929	15,541	170,563
1909	459	7,385	1930	12,522	177,964
1910	340	3,820	1931	13,960	222,583
1911	466	5,294	1932	4,295	57,670
1912	876	6,500	1933	4,605	60,621
1913	460	3,700	1934	6,168	69,325
1914	760	5,928	1935	10,204	68,372
1915	692	4,002	1936	10,185	165,131
1916	110	550	1937	8,425	140,261
1917	220	2,180	1938	9,374	113,164
1918	37	333			
1919	385	3,810	Totals	201,387	$1,928,725

CALCIUM SILICATE

Bibliography: Mining and Metallurgy: Oct., 1935.

During 1938 there were commercial shipments of calcium silicate reported in California, coming from two properties in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of either operator.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. Experiments now being conducted by Mr. A. M. M. Russell, Testing Engineer of the State Harbor Commissioners, indicate that wollastonite should be a valuable addition to concrete.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestone near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate ($CaSiO_3$) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of $4\frac{1}{2}$ to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in these California mineral production reports as wollastonite.

CARBON DIOXIDE GAS

Bibliography: State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. During 1938 there were two companies producing carbon dioxide from wells near Niland. The 1938 figures are combined under the 'Unapportioned' item to conceal the output of either operator.

Carbon Dioxide Gas Production in California, by Years

Year	M cubic feet	Value
1894	80	$4,072
1895	800	12,000
1896	81	1,300
1897		
1933		
1934 *	15,440	1,822
1935		
1936 *	89,777	64,787
1937		
1938	*	*
Totals	106,178	$83,981

* Annual details concealed under 'Unapportioned.'

CLAY (Pottery)

Bibliography: State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.), XXXV. Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these, 22 contributed in 1938. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

During 1938 there was a total of 54 properties in 22 counties which reported an output of 304,564 short tons of pottery clay valued at $582,608 f.o.b. rail-shipping point for the crude material, as compared with 61 properties in 21 counties producing 354,669 tons, worth $705,200 in 1937.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data set in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1938 is shown herewith:

Pottery Clay in 1938

County	Tons	Value	Used in the manufacture of
Alameda	5,244	$5,532	Roofing, floor, and mantel tile; chimney, drain, and sewer pipe. Prepared clay and various.
Amador[a]	42,679	73,422	Architectural terra cotta; fire clay and refractories; chimney; drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Kern[b]	38,910	64,821	Floor and fancy tile, sanitary ware, art pottery, China, and oil-well drilling-mud.
Los Angeles	30,766	55,605	Red earthenware; chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.
Orange	22,522	89,905	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.
Placer	60,708	85,337	Architectural terra cotta; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.
Riverside	47,977	87,489	Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.
San Bernardino	3,651	26,249	Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire-sand and various.
Ventura[b]	11,624	10,453	Oil-well drilling-mud.
Calaveras, Contra Costa, Fresno, Humboldt, Imperial, Marin, Mono, San Diego, San Luis Obispo[b], Santa Barbara, Santa Clara, Sonoma, Stanislaus, Sutter*	40,483	83,746	Drain, roofing, and mantel tile; saggers; electrical porcelain; refractories; red earthenware, garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various.
Totals	304,564	$582,608	

[a] Includes firesand.
[b] Includes clay and shale used for oil-well drilling-mud.
* Combined to conceal the output of single operators in each.

POTTERY CLAY PRODUCTS

The value of the various pottery clay products made in California during 1938 totaled $10,437,383, compared with $11,307,859 in 1937. The distribution for 1938 is shown in the following tabulation:

Product	Number producers	Tons	Value
Architectural terra cotta, chimney pipe and flue lining	11	10,226	$457,376
Drain pipe	16	7,822	158,544
Roofing tile	17	35,285	645,213
Floor, faience, mantel, and hand-made tile	24	----------	2,096,512
Sewer pipe	9	52,639	1,346,404
Red earthenware	5	----------	142,749
Stoneware and chemical stoneware	5	----------	435,666
Electrical porcelain	3	----------	241,500
Conduit pipe	3	----------	72,927
Fire clay and high temperature cement	6	10,444	138,570
Chinaware	5	----------	2,345,480
Sanitary ware and plumbing fixtures	5	----------	1,900,077
Miscellaneous: chimney accessories, gas-stove radiants, porcelain shapes, gas-house tank-blocks, grog, molding clay, segment blocks and liners, vents, glass tank blocks and liners, light aggregate, glazed kitchenware, quarries, swimming-pool gutters, fire clay shapes, and specialties	16	----------	457,365
Total value	----------	----------	$10,437,383

Pottery Clay Production of California, by Years.

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887	75,000	$37,500	1914	179,948	$167,552
1888	75,000	37,500	1915	157,866	133,724
1889	75,000	37,500	1916	134,636	146,538
1890	100,000	50,000	1917	166,298	154,602
1891	100,000	50,000	1918	112,423	166,788
1892	100,000	50,000	1919	135,708	245,019
1893	24,856	67,284	1920	203,997	440,689
1894	28,475	35,073	1921	225,120	362,172
1895	37,660	39,685	1922	277,232	473,184
1896	41,907	62,900	1923	376,863	697,841
1897	24,592	30,290	1924	417,928	651,857
1898	28,947	33,747	1925	537,587	674,376
1899	40,600	42,700	1926	801,461	806,509
1900	59,636	60,956	1927	867,419	872,661
1901	55,679	39,144	1928	887,807	1,394,950
1902	67,933	74,163	1929	839,949	1,127,527
1903	90,972	99,907	1930	938,586	795,517
1904	84,149	81,952	1931	332,680	408,931
1905	133,805	130,146	1932	167,284	204,890
1906	167,267	162,283	1933	141,629	211,711
1907	160,385	254,454	1934	190,510	245,900
1908	208,042	325,147	1935	240,014	377,969
1909	299,424	465,647	1936	382,823	646,920
1910	249,028	324,099	1937	354,669	705,200
1911	224,576	252,759	1938	304,564	582,608
1912	199,605	215,683			
1913	231,179	261,273	Totals	12,358,618	$16,027,427

DIATOMITE (Diatomaceous Earth)

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma and Tehama counties.

As about 70 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were six operators during 1938 in Los Angeles, Monterey, and Santa Barbara counties. The shipments during the year showed a decrease in total tonnage and value compared with 1937.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.

Total Production of Diatomite in California.

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889	39	$1,335	1915	12,400	$62,000
1890			1916	15,322	80,649
1891			1917	24,301	127,510
1892			1918	35,963	189,459
1893	50	2,000	1919	40,200	217,800
1894	51	2,040	1920	60,764	1,056,260
1895			1921		
1896			1922	*90,739	1,016,675
1897	5	200	1923		
1898			1924	*193,064	5,729,736
1899			1925		
1900			1926		
1901			1927	*275,403	1,995,923
1902	422	2,532	1928		
1903	2,703	16,015	1929		
1904	6,950	112,282	1930	*300,017	4,848,661
1905	3,000	15,000	1931		
1906	2,430	14,400	1932		
1907	2,531	28,948	1933	*203,228	3,104,154
1908	2,950	32,012	1934		
1909	500	3,500	1935		
1910	1,843	17,617	1936	*290,908	4,243,572
1911	2,194	19,670	1937		
1912	4,129	17,074	1938	*	*
1913	8,645	35,968			
1914	12,840	80,350	Totals	1,593,591	$22,933,557

* Annual details concealed under 'Unapportioned.'

DOLOMITE

Bibliography: State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII-XXXIV.

The 1938 output of dolomite in California came from three properties—one each in Inyo, Los Angeles, and San Benito counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of competitive operators. The 1938 production showed a decrease in amount and value as compared with that of 1937, which was 112,371 tons, worth $24,603.

The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco dash-coat, terrazo, artstone, for the manufacture of CO_2, and mineral wool.

Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value	Year	Tons	Value
1915	4,192	$14,504	1928	38,379	$85,342
1916	13,313	46,566	1929	58,644	156,928
1917	27,911	66,416	1930*	66,564	161,245
1918	24,560	79,441	1931		
1919	24,502	67,953	1932	35,275	40,956
1920	42,388	132,791	1933	54,456	176,575
1921	31,195	99,155	1934*	108,645	304,984
1922	52,409	114,911	1935		
1923	69,519	142,615	1936	25,807	63,102
1924	28,843	71,271	1937	12,371	24,632
1925	42,852	104,900	1938	*	*
1926	68,640	119,313			
1927	45,976	79,442	Totals	976,441	$2,153,033

*Annual details concealed under 'Unapportioned.'

FELDSPAR

Bibliography: State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI, XXXIV-XXXV. Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The 1938 output of feldspar in California came from a single property each in Fresno and San Diego counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The 1938 production was a decrease in quantity and value as compared with that of 1937 which was 2,686 tons worth $10,930.

Total Feldspar Production in California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910	760	$5,720	1926	7,300	56,400
1911	740	4,560	1927	10,932	86,101
1912	1,382	6,180	1928	14,628	93,745
1913	2,129	7,850	1929	13,327	78,404
1914	3,530	16,565	1930	5,014	35,654
1915	1,800	9,000	1931	4,795	59,921
1916	2,630	14,350	1932	2,294	15,988
1917	11,792	46,411	1933		
1918	4,132	22,061	1934*	2,655	30,611
1919	1,272	12,965	1935	3,265	21,855
1920	4,518	26,189	1936	3,430	24,959
1921	4,349	28,343	1937	2,686	10,930
1922	4,587	37,109	1938	*	*
1923	11,100	81,800			
1924	9,055	68,112			
1925	8,165	59,615	Totals	143,267	$961,393

* Annual details concealed under 'Unapportioned.'

FLUORSPAR

Bibliography: State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

During 1938 there was no commerical production of fluorspar reported in California.

The 1937 output of fluorspar came from a single property in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. This material was shipped to steel mills to be used as a flux. The combined production of 1933 and 1934 amounted to a total of 227 tons worth $3,631.

Fluorspar, or calcium fluoride, CaF_2, is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at $991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent CaF_2 and not over 5 per cent SiO_2, $18 to $19 per ton; No. 2 lamp, $18 to $19 per ton.

GARNET (Abrasive)

During 1938 there was a shipment of abrasive garnets as a by-product from a tungsten mine near Bishop in Inyo County. This was the first commercial production reported in California. The exact figures are concealed under the 'Unapportioned' item so as not to reveal the output of a single operator.

Most garnets are utilized on paper and cloth used for woodworking and shoe manufacture.

Massive deposits of garnet have been noted in several places in California but little has been done to commercialize them owing to the lack of a market.

GEMS

Bibliography: State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.), XXXIV-XXXV. Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The gem material reported in California during 1938 had a total value of

$4,575. This output came from Fresno, Imperial, Modoc, Monterey, San Diego, and Santa Clara counties, and consisted of jasper, kunzite, iceland spar, iridescent obsidian, tourmaline, and topaz. The above value showed a decrease as compared with that of 1937 which was worth $2,075.

Total Production of Gem Materials in California.

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900	$20,500	1921	$10,954
1901	40,000	1922	1,312
1902	162,100	1923	13,220
1903	110,500	1924	4,800
1904	136,000	1925	10,663
1905	148,500	1926	9,049
1906	497,090	1927	7,035
1907	232,642	1928	22,200
1908	208,950	1929	26,850
1909	193,700	1930	3,540
1910	237,475	1931	5,607
1911	51,824	1932	4,961
1912	23,050	1933	690
1913	13,740	1934	2,456
1914	3,970	1935	945
1915	3,565	1936	2,878
1916	4,752	1937	2,075
1917	3,049	1938	4,575
1918	650		
1919	5,425		
1920	36,056	Total value	$2,267,248

GRAPHITE

Bibliography: State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII, XXXV. Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1938 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

Graphite Production of California, by Years.

Aecording to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	Pounds	Value	Year	Pounds	Value
1901	128,000	$4,480	1923		
1902	84,000	1,680	1925–1927	*76,000	13,120
1903			1928		
1913	2,500	25	1931–1933	*156,000	1,950
1914			1934		
1915			1935	*	*
1916	29,190	2,335	1936		
1917–1922	*624,000	26,160	Totals	1,869,690	$86,975
1919–1920	*770,000	37,225			

* Annual details concealed under 'Unapportioned,' on account of a single producer.

GYPSUM

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXX-XXXV (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1938 there was a production of gypsum in California coming from three properties in Fresno County and one each in Imperial and Riverside counties and amounting to 161,996 short tons valued at $327,821. In addition to the above figures there was considerable amount of gypsum coming from Alameda County which is obtained in a chemical process of reducing magnesium salts from bittern waters with lime, the amount of which is not included in the State total as the figures are already used in those of magnesium salts and lime. The 1938 output showed a decrease in both amount and value as compared with those of 1937 which were 186,160 tons valued at $384,431.

Total Production of Gypsum in California.

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	$27,000	1914	29,734	$78,375
1888	2,500	25,000	1915	20,200	48,953
1889	3,000	30,000	1916	33,384	59,533
1890	3,000	30,000	1917	30,825	56,840
1891	2,000	20,000	1918	19,695	37,176
1892	2,000	20,000	1919	19,813	50,579
1893	1,620	14,280	1920	20,507	92,535
1894	2,446	24,584	1921	37,412	78,875
1895	5,158	51,014	1922	47,084	188,336
1896	1,310	12,580	1923	86,410	289,136
1897	2,200	19,250	1924	25,569	53,210
1898	3,100	23,600	1925	107,613	172,444
1899	3,663	14,950	1926	114,868	211,337
1900	2,522	10,088	1927	94,630	292,090
1901	3,875	38,750	1928	104,790	200,567
1902	10,200	53,500	1929	140,844	396,951
1903	6,914	46,441	1930	116,865	243,507
1904	8,350	56,592	1931	88,354	199,198
1905	12,859	54,500	1932	46,867	93,818
1906	21,000	69,000	1933	59,235	120,451
1907	8,900	57,700	1934	58,149	113,606
1908	34,600	155,400	1935	70,833	151,807
1909	30,700	138,176	1936	143,549	282,703
1910	45,294	129,152	1937	186,160	384,431
1911	31,457	101,475	1938	161,996	327,821
1912	37,529	117,388			
1913	47,100	135,050	Totals	2,201,372	$5,699,749

LIMESTONE

Bibliography: State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII-XXXV (inc.). Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by 21 properties in 12 counties in California during 1938 to the amount of 302,655 short tons valued at $729,149, this being a decrease in both amount and value from the 1937 output, which was 351,755 tons worth $830,562. The 1938 yield came from four properties each in El Dorado and Santa Clara counties; three in San Bernardino County; two each in Santa Cruz and Tuolumne counties; and one each in Butte, Fresno, Inyo, Los Angeles, Riverside, San Luis Obispo, and San Mateo counties.

Distribution of the 1938 output of limestone was as follows:

County	Tons	Value
El Dorado	135,142	$304,420
San Bernardino	14,313	44,795
Santa Clara[b]	98,944	128,793
Butte, Fresno[a], Inyo, Los Angeles, Riverside, San Luis Obispo, San Mateo[b], Santa Cruz, and Tuolumne*	54,256	251,141
Totals	302,655	$729,149

* Combined to conceal the output of individual operators in each.
[a] Includes marl.
[b] Includes shells.

The amount here does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1938 approximately 128,195 tons valued at $310,449 was used for agricultural purposes and poultry grits.

Limestone Production of California, by Years.

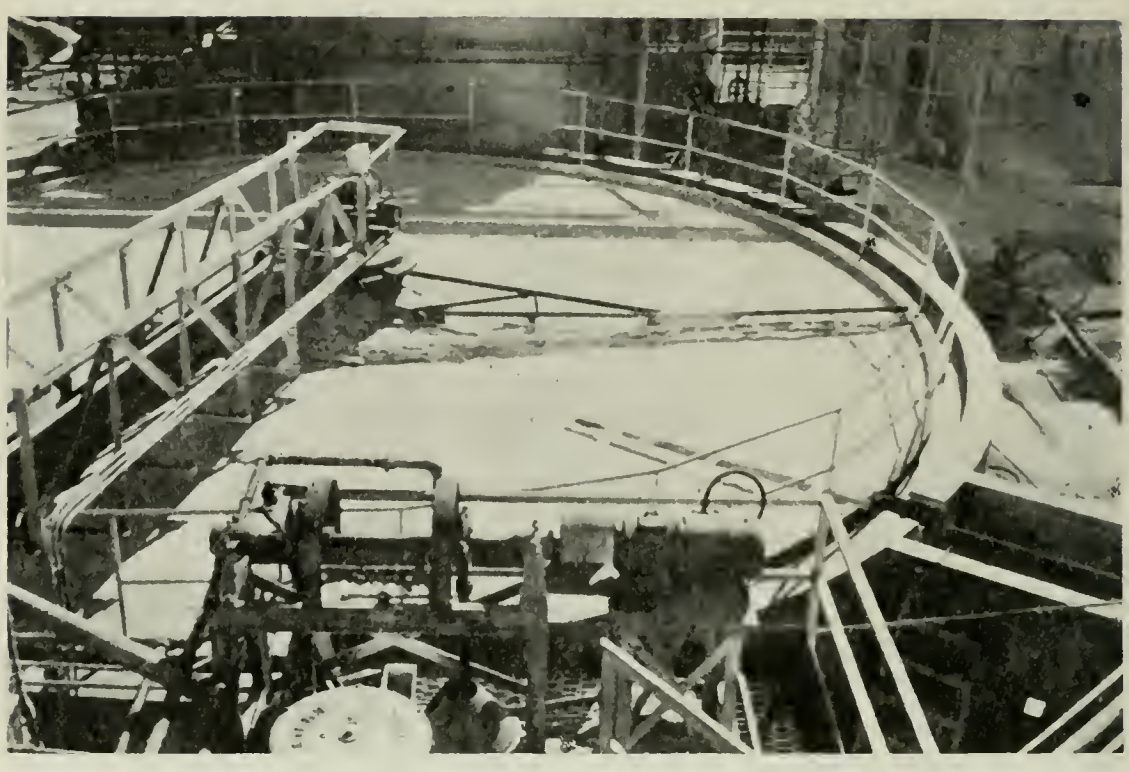
The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Year	Tons	Value	Year	Tons	Value
1894	15,420	$19,275	1918	208,566	$456,258
1895	71,355	71,690	1919	88,291	248,145
1896	68,184	71,112	1920	90,120	298,197
1897	36,796	38,556	1921	75,921	305,912
1898	27,686	24,548	1922	84,382	282,181
1899	30,769	29,185	1923	143,266	348,464
1900	32,791	31,532	1924	219,476	582,660
1901	76,937	99,445	1925	319,977	494,525
1902	71,422	90,524	1926	108,795	367,501
1903	125,919	163,988	1927	699,790	663,957
1904	40,207	87,207	1928	127,895	397,935
1905	192,749	323,325	1929	168,315	557,617
1906	80,262	162,827	1930	169,477	508,751
1907	230,985	406,041	1931	177,268	560,699
1908	273,890	297,264	1932	168,950	487,788
1909	337,676	419,921	1933	207,371	487,712
1910	684,635	581,208	1934	198,057	461,139
1911	516,398	452,790	1935	227,214	496,054
1912	613,375	570,248	1936	295,792	661,757
1913	301,918	274,455	1937	351,755	830,562
1914	572,272	517,713	1938	302,665	729,149
1915	146,324	156,288			
1916	187,521	217,733			
1917	237,279	356,396	Totals	9,405,103	$15,689,234

LITHIA

Bibliography: State Mineralogist Reports II, IV, XIV, XXI, XXX, XXXV. Bulletins 38, 67, 91.

During 1938 lithium salts were again produced in California; but coming from a single property, the figures are concealed under the 'Unapportioned' item. The 1938 material came from the brines of Searles Lake in San Bernardino County at the plant of the American Potash and Chemical Corporation, in the form of sodium-lithium phosphate, and was the first output of this kind, previous production being the mineral lepidolite.



Skimming off sodium-lithium phosphate, in plant of American Potash and Chemical Co., at Searles Lake, San Bernardino Co.

Photo by Walter W. Bradley

Lithia mica, lepodolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1937 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899	124	$4,600	1920	10,046	$153,502
1900	440	11,000	1921		
1901	1,100	27,500	1922	*1,365	20,781
1902	822	31,880	1923		
1903	700	27,300	1924	109	2,269
1904	641	25,000	1925		
1905	25	276	1926		
1906			1927	*550	13,900
1915	91	1,365	1928		
1916	71	1,065	1929		
1917	880	8,800	1938	*	*
1918	4,111	73,998			
1919	800	14,400	Totals	21,875	$417,636

* Annual details concealed under 'Unapportioned.'

MICA

Bibliography: State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII-XXXV (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv.,Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934. The 1938 output of mica came from a single property in Imperial County. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Production of mica in California has been as follows:

Year	Tons	Value	Year	Tons	Value
1902	50	$2,500	1934		
1903	50	3,800	1935		
1904	50	3,000	1936	3,833	$15,650
1929			1937		
1930	2,240	15,260	1938	4,969	31,751
1931					
1932					
1933	1,957	13,963	Totals	13,149	$85,924

* Annual details concealed under 'Unapportioned.'

MINERAL PAINT

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.), XXXV. Bulletins 38, 91.

During 1938 no output of mineral paint was reported in California. In 1937 there was a small amount of mineral paint produced, which came from a single property each in Nevada, Placer and Yuba counties. The details are concealed under 'Unapportioned' so as not to reveal individual output. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890	40	$480	1915	311	$1,756
1891	22	880	1916	643	3,960
1892	25	750	1917	520	2,700
1893	590	26,795	1918	728	4,738
1894	610	14,140	1919	1,780	17,055
1895	750	8,425	1920	779	8,477
1896	395	5,540	1921	446	4,748
1897	578	8,165	1922	1,620	13,277
1898	653	9,698	1923	1,049	11,773
1899	1,704	20,294	1924	532	5,234
1900	529	3,993	1925	669	6,969
1901	325	875	1926	569	5,846
1902	589	1,533	1927	919	9,592
1903	2,370	3,720	1928		
1904	270	1,985	1929	467	2,820
1905	754	4,025	1930	250	3,000
1906	250	1,720	1931		
1907	250	1,720	1932		
1908	335	2,250	1933		
1909	305	2,325	1935	570	5,550
1910	200	2,040	1936		
1911	186	1,184	1937	*	*
1912	300	1,800	1938		
1913	303	1,780			
1914	132	847	Totals	23,717	$227,648

* Annual details concealed under 'Unapportioned.'

MINERAL WATER

Bibliography: State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.), XXXV. U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water during 1938 amounted to 26,900,959 gallons valued at $853,998, as compared with 18,309,729 gallons valued at $1,130,810 in 1937. The 1938 output came from springs on 41 properties in 20 counties, and was distributed as follows:

County	Gallons	Value
Lake	26,560	$12,770
Los Angeles	8,398,855	349,028
Napa	53,151	9,658
Sonoma	123,604	4,365
Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Marin, Modoc, Placer, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou*	18,398,788	478,177
Totals	26,900,959	$853,998

* Combined to conceal the output of operators in each.

The production above tabulated came either from springs or artesian wells, and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.

Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,[1] and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887	618,162	$144,368	1914	2,443,572	$476,169
1888	1,112,202	252,990	1915	2,274,267	467,738
1889	808,625	252,241	1916	2,273,817	410,112
1890	258,722	89,786	1917	1,942,020	340,566
1891	334,553	139,959	1918	1,808,791	375,650
1892	331,875	162,019	1919	2,233,842	340,117
1893	383,179	90,667	1920	2,391,791	421,643
1894	402,275	184,481	1921	3,446,278	367,476
1895	701,397	291,500	1922	4,276,346	486,424
1896	808,843	337,434	1923	5,487,276	616,919
1897	1,508,192	345,863	1924	8,159,211	818,726
1898	1,429,809	213,817	1925	12,115,072	1,230,455
1899	1,338,537	406,691	1926	14,074,877	1,171,550
1900	2,456,115	268,607	1927	16,644,423	1,487,183
1901	1,555,328	559,057	1928	25,049,002	1,304,969
1902	1,701,142	612,477	1929	27,032,083	2,040,615
1903	2,056,340	558,201	1930	37,354,111	2,870,663
1904	2,430,320	496,946	1931	26,164,331	1,347,860
1905	2,194,150	538,700	1932	19,031,224	1,495,988
1906	1,585,690	478,186	1933	15,650,406	719,746
1907	2,924,269	544,016	1934	19,882,436	1,071,197
1908	2,789,715	560,507	1935	16,659,254	940,333
1909	2,449,834	465,488	1936	19,348,513	777,899
1910	2,335,259	522,009	1937	18,309,729	1,130,810
1911	2,637,669	590,654	1938	26,900,959	853,998
1912	2,497,794	529,384			
1913	2,350,792	599,748	Totals	372,954,419	$33,890,601

[1] Cronise, T. F., The natural wealth of California, p. 182, 1868.

PHOSPHATES

Bibliography: State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite, Li (AlF) PO_4, have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia. During 1938, recovery began on a commercial scale of sodium-lithium phosphate at the plant of the American Potash and Chemical Corporation, at Searles Lake, San Bernardino County. However, the product is sold for its lithium content rather than the phosphate, hence we record it under Lithia.

PUMICE and VOLCANIC ASH

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXV (inc.), XXX-XXXII (inc.). Bulletin 38. U. S. Bureau of Mines, I. G. 6560. (See 'Tufa.')

The production of pumice and volcanic ash in California during the year 1938 amounted to 18,738 short tons valued at $105,207. This came from five properties each in Inyo and Siskiyou counties; two each in Mono and Napa counties; and one each in Amador, Kern, Madera, and San Luis Obispo counties.

The material from four deposits in Inyo County and that from Mono, Napa, and Siskiyou counties, was 11,297 tons of lump pumice, which was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes, and for chicken-house litter. The production in part of one property in Inyo, and that in Amador, Kern, Madera, and San Luis Obispo counties was 7,486 tons of volcanic ash, or tuff variety, and was employed in making soap, cleanser compounds, as a

House built of scoria from Glass Mountain, Siskiyou County.

Photo by H. W. Free

concrete filler in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

Pumice Production of California, by Years.

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not against until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	$500	1925	5,319	$32,937
1910			1926	7,170	48,350
1911			1927	13,779	168,896
1912	100	2,500	1928	10,440	105,055
1913	3,590	4,500	1929	10,449	76,123
1914	50	1,000	1930	12,947	128,847
1915	380	6,400	1931	11,711	108,130
1916	1,246	18,092	1932	9,891	86,034
1917	525	5,295	1933	8,243	61,067
1918	2,114	28,669	1934	9,951	54,748
1919	2,388	43,657	1935	14,890	87,055
1920	1,537	25,890	1936	17,132	143,709
1921	406	6,310	1937	10,392	79,005
1922	613	4,248	1938	18,783	105,207
1923	2,936	16,309			
1924	4,919	33,404	Totals	171,951	$1,481,937

PYRITES

Bibliography: State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1938 came from a single property in Shasta County and showed a decrease in both quantity and value from that of 1937. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

Pyrites Production in California, by Years.

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898	6,000	$30,000	1920	146,001	$530,581
1899	5,400	28,620	1921	110,025	473,735
1900	3,642	21,133	1922	151,381	570,425
1901	4,578	18,429	1923	148,004	555,308
1902	17,525	60,306	1924	124,214	517,835
1903	24,311	94,000	1925	129,500	528,550
1904	15,043	62,992	1926	100,896	466,088
1905	15,503	63,958	1927	130,910	564,823
1906	46,689	145,895	1928	90,566	400,627
1907	82,270	251,774	1929	79,169	363,717
1908	107,081	610,335	1930	39,958	194,228
1909	457,867	1,389,802	1931	25,402	131,174
1910	42,621	179,862	1932		
1911	54,225	182,954	1933	72,271	297,832
1912	69,872	203,470	1934		
1913	79,000	218,537	1935	157,129	547,754
1914	79,267	230,058	1936		
1915	92,462	293,148	1937	155,107	541,915
1916	120,525	372,969	1938	*	*
1917	111,325	323,704			
1918	128,329	425,012			
1919	147,024	540,300	Totals	3,370,092	$12,431,900

* Annual details concealed under 'Unapportioned.'

SHALE OIL

Bibliography: State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb. 1925. Min. Congress Jour., Dec. 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

Shale Oil Production of California, by Years

Year	Barrels	Value
1922		
1923	4,333	$44,262
1924		
1925	8,688	55,240
1926		
1927	8,819	9,998
1928		
Totals	21,840	$109,500

* Annual details concealed under 'Unapportioned.'

SILICA (Sand and Quartz)

Bibliography: State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXIII (inc.), XXXV. Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1938 amounted to 63,167 short tons valued at $278,676 f.o.b. rail-shipping point, and came from two properties in Contra Costa County and one each in Monterey, Orange, Riverside, and San Diego counties. The above was a decrease in both amount and value from the output of 1937 which was 84,313 tons worth $348,987.

The glass sand came from Contra Costa, Monterey and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of $2 per ton.

Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	$3,500	1920	25,324	$96,793
1900	2,200	2,200	1921	10,569	49,179
1901	5,000	16,250	1922	9,874	31,016
1902	4,500	12,225	1923	7,964	30,420
1903	7,725	7,525	1924	6,808	35,006
1904	10,004	12,276	1925	12,498	96,780
1905	9,257	8,121	1926	30,010	104,317
1906	9,750	13,375	1927	24,636	94,762
1907	11,065	8,178	1928	14,814	66,679
1908	9,255	22,045	1929	18,686	79,210
1909	12,259	25,517	1930	17,802	71,380
1910	19,224	18,265	1931	43,330	182,769
1911	8,620	8,672	1932	33,997	136,324
1912	13,075	15,404	1933	70,329	266,520
1913	18,618	21,899	1934	70,432	296,643
1914	28,538	22,688	1935	70,835	297,272
1915	28,904	34,322	1936	77,830	310,278
1916	20,880	48,908	1937	84,313	348,987
1917	19,376	41,166	1938	63,167	278,676
1918	23,257	88,930			
1919	18,659	101,600	Totals	976,384	$3,395,077

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Bibliography: State Mineralogist Reports XX, XXIII, XXIV, XXVII, XXXV. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates (Al_2SiO_5), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Cyanite is also an aluminum silicate (Al_2SiO_5), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of cyanite is being mined in Imperial County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though differing somewhat in composition from the above, being a basic aluminum silicate ($HAl_8BSi_3O_{20}$), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1922			1931		
1923 *	4,584	$98,790	1932 *	1,244	$21,800
1924			1933		
1925			1934 *	3,035	69,026
1926 *	4,810	203,000	1935		
1927			1936 *	3,112	89,214
1928 *	4,276	76,000	1937		
1929			1938 *	2,681	70,477
1930 *	4,359	198,893	Totals	28,101	$827,200

* Annual details concealed under 'Unapportioned.'

SOAPSTONE and TALC

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII-XXXIV. Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1938 amounted to 28,346 short tons valued at $290,810. This was a decrease in both quantity and values from the 1937 figures, which were 29,657 tons valued at $347,772. Of the 1938 production 26,811 tons were high-grade talc from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper, for rubber manufacture, and some in ceramics. The remainder of 1,535 tons was soapstone and came from Butte, El Dorado, and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from Vermont and New York and of massive soapstone from Virginia.

During 1938 imports of talc, steatite, etc., totaled 22,127 short tons valued at $391,198, as compared with 26,876 tons worth $472,819 during 1937, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

Talc Production of California, by Years.

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893	400	$17,750	1917	5,267	$45,279
1894			1918	11,760	85,534
1895	25	375	1919	8,764	115,091
1896			1920	11,327	221,362
1897			1921	8,752	130,078
1898			1922	13,378	197,186
1899			1923	17,439	252,661
1900			1924	16,179	242,770
1901	10	119	1925	15,465	239,084
1902	14	288	1926	17,004	255,645
1903	219	10,124	1927	16,218	164,744
1904	228	2,315	1928	18,668	251,372
1905	300	3,000	1929	18,676	193,493
1906			1930	15,861	154,258
1907			1931	13,472	109,940
1908	3	48	1932	10,690	122,880
1909	33	280	1933	14,451	153,668
1910	740	7,260	1934	13,920	158,606
1911			1935	17,332	170,830
1912	1,750	7,350	1936	25,043	309,287
1913	1,350	6,150	1937	29,657	347,772
1914	1,000	4,500	1938	28,346	290,810
1915	1,663	14,750			
1916	1,703	9,831	Totals	357,707	$4,395,490

STRONTIUM

Bibliography: State Mineralogist Report XXVI, XXVII, XXXV, Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite ($SrSO_4$), and the carbonate, strontianite ($SrCO_3$) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80% $SrCO_3$ have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value	Year	Tons	Value
1916	57	$2,850	1919		
1917	3,050	37,000			
1918	2,900	33,000	Totals	6,007	$72,850

SULPHUR

Bibliography: State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1938 there was one producer of sulphur in California, the material coming from Inyo County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of the single operator. For the two years, 1937-1938, the production totaled 9,451 short tons valued at $12,010. The 1938 output of sulphur was a decrease from that of 1937. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	Tons	Value	Year	Tons	Value
1865, 1866, 1867*	941	$53,500	1932, 1933*	1,991	$32,838
1868 to 1922			1934	4,412	67,656
1923, 1924*	185	4,071	1935, 1936*	5,308	61,603
1925 to 1928			1937, 1938*	9,451	120,010
1929, 1930, 1931*	265	9,025	Totals	22,553	$348,703

* Annual details concealed under 'Unapportioned.'

ZIRCON

Bibliography: State Mineralogist Report XXXIV.

During 1938 there were no shipments of zircon sands in California. In 1937 for the first time, zircon was reported in commercial quantities in this State. The Kaufield gold dredge near Lincoln placer recovered considerable zircon from their black sands some of which was shipped for experimental purposes in the manufacture of refractories and for an abrasive in sand blast.

The chief source of zirconium is the mineral zircon, a zirconium silicate, $ZrSiO_4$. Zircon is used, as a gem, being next to the diamond in brilliancy; as a refractory, molds for steel, insulation in electric heating devices, as a coating on other refractories, coating of welding rods, and in the manufacture of other zirconium compounds.

The metal zirconium is used in radio tubes as an alloy in steel, with copper, etc.

CHAPTER SIX

SALINES

Bibliography: State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII-XXXV (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromide, and in 1931 by iodine and in 1938 by the alum minerals. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from $13,216,290 in 1937 to $14,279,949 in 1938.

The following table gives details for each year:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Borates	326,099 tons	$6,206,619	276,144 tons	$5,014,237	$1,192,382—
Magnesium salts	3,867 tons	316,669	24,167 tons	469,636	152,967+
Salt	370,431 tons	1,043,611	395,746 tons	1,099,737	56,126+
Soda	153,685 tons	1,461,057	178,105 tons	2,023,610	562.553+
Unapportioned		[a]4,187,600		[b]5,672,729	1,485,129+
Total values		$13,216,270		$14,279,949	
Net increase					$1,063,519

[a] Includes bromine, calcium chloride, iodine and potash.
[b] Includes alunogen, bromine, calcium chloride, iodine, and potash.

ALUM MINERALS

There are several minerals found in California that are considered natural alums. They are hydrous aluminum sulphates combined with sulphates of iron, potassium, sodium or magnesium. The most important are: Alunite, $K_2Al_6(OH)_{12}(SO_4)_4$, a basic hydrous aluminum and potassium sulphate, and Alunogen, $Al_2(SO_4)_3.16H_2O$, an hydrous aluminum sulphate.

In 1938 a small production and some development work was done on an alunogen deposit near Corona, Riverside County. This material was sold as a soil conditioner; being the first recorded commercial production reported in California. The annual details are combined under 'Unapportioned' item to conceal the output of the single operator. An alunite deposit near Glen Ellen, Sonoma County, was opened up several years ago and some development work is being done in hopes of commercializing this mineral.

Alunite and alunogen are used as fertilizers and soil conditioners and are possible sources of the metal aluminum. Alunite can also be utilized as a source of potash and to manufacture alum.

BORATES

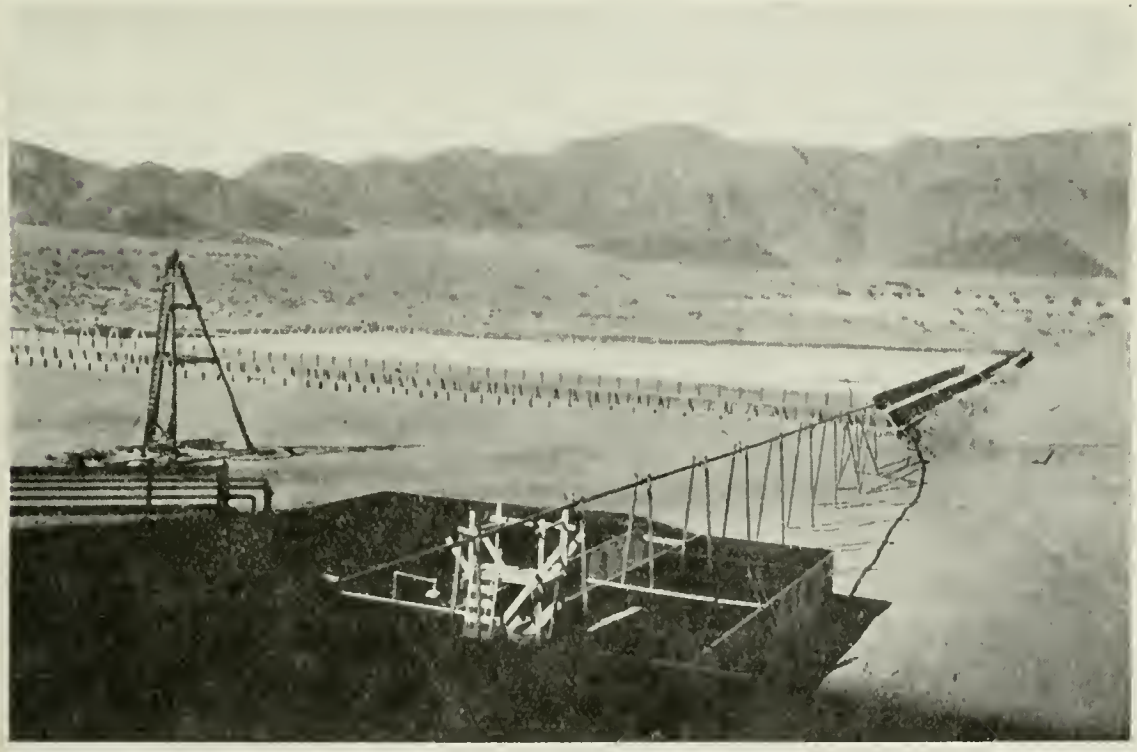
Bibliography: State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIX (inc.), XXV-XXVII (inc.), XXXIII-XXXIV. Bulletins 24, 67, 91.

During 1938 there was produced in California a total of 240,899 tons of borate materials compared with 346,487 tons for the year 1937. The material shipped during the year included the new sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely refined into borax of commerce before shipping, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent A.B.A. This is approximately the average A.B.A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1938 production totaled 276,144 tons valued at $5,014,237. This was a decrease both in quantity and value from the 1937 output, which was 326,099 tons worth $6,206,619.

The total amount of borates exported from the United States[1] during the year 1938 was 77,519 tons valued at $2,642,446, as compared with 153,772 tons valued at $4,708,691 in 1937.



Outside borax storage, American Potash and Chemical Co., at Searles Lake, San Bernardino County.

Photo by Walter W. Bradley

[1] Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1938, Part 1.

Total Production of Borate Materials in California.

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near (probertite) in Kern County. The brines of Searles Lake are also an important source.

The total production of borate materials in California is shown in the following table:

Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	$9,478	1903	34,430	$661,400
1865	126	94,099	1904	45,647	698,810
1866	201	132,538	1905	46,334	1,019,158
1867	220	156,137	1906	58,173	1,182,410
1868	32	22,384	1907	53,413	1,200,913
1869	----------	----------	1908	22,200	1,117,000
1870	----------	----------	1909	16,628	1,163,960
1871	----------	----------	1910	16,828	1,177,960
1872	140	89,600	1911	50,945	1,456,672
1873	515	255,440	1912	42,135	1,122,713
1874	915	259,427	1913	58,051	1,491,530
1875	1,168	289,080	1914	62,500	1,483,500
1876	1,437	312,537	1915	67,004	1,663,521
1877	993	193,705	1916	103,523	2,409,375
1878	373	66,257	1917	109,944	2,561,958
1879	364	65,443	1918	88,772	1,867,908
1880	609	149,245	1919	66,791	1,717,192
1881	690	189,750	1920	127,065	2,794,206
1882	732	201,300	1921	50,136	1,096,326
1883	900	265,500	1922	[2]39,087	1,068,025
1884	1,019	198,705	1923	62,667	1,893,798
1885	942	155,430	1924	52,070	1,599,149
1886	1,285	173,475	1925	46,124	1,526,938
1887	1,015	116,689	1926	47,605	1,625,298
1888	1,405	196,636	1927	72,462	3,043,260
1889	965	145,473	1928	109,722	3,378,552
1890	3,201	480,152	1929	144,678	3,312,085
1891	4,267	640,000	1930	209,869	3,686,817
1892	5,525	838,787	1931	206,405	5,753,037
1893	3,955	593,292	1932	179,356	2,856,470
1894	5,770	807,807	1933	197,495	3,019,513
1895	5,959	595,900	1934	240,696	5,524,262
1896	6,754	675,400	1935	280,249	4,602,064
1897	8,000	1,080,000	1936	313,389	5,911,093
1898	8,300	1,153,000	1937	326,099	6,206,619
1899	20,357	1,139,882	1938	276,144	5,014,237
1900	25,837	1,013,251			
1901	22,221	982,380			
1902	[1]17,202	2,234,994	Totals	4,078,042	$103,880,902

[1] Refined borax, [2] Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1938 output showed an increased value and amount as compared with 1937 production; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926–1928*	158	$120,480	1932–1934*	559	$146,547
1929–1931*	802	552,933	1935–1937*	805	191,465	
			1938	914	327,823
			Totals	3,238	$1,339,248

*Annual details concealed under 'Unapportioned.'

CALCIUM CHLORIDE

Bibliography: U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1938 the production of calcium chloride in California came from two plants in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1938 output showed a decrease in both amount and value as compared with that of 1937.

Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1921	683	$22,980	1930–1931*	9,688	$103,237
1922–1923*	1,204	26,580	1932–1933*	3,103	15,500
1924–1925*	10,988	328,876	1934–1935*	4,048	16,196
1926–1927*	34,195	508,748	1936–1937*	7,227	35,073
1928–1929*	12,020	114,080	1938	*	*
			Totals	83,156	$1,171,270

* Annual details concealed under 'Unapportioned.'

IODINE

Bibliography: State Mineralogist Report XXXIV. U. S. Bureau of Mines I. C. 6387.

In 1936 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and value over 1935. The annual details for 1936 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1935-1936 production came from three plants in Los Angeles County, and amounted to 487,401 pounds, valued at $379,702.

Total Iodine Production in California.

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929–1931–1933*	696,297	$1,374,311
1934	355,279	423,016
1935–1936*	487,401	379,702
1937–1938*	624,318	508,119
Totals	2,163,295	$2,685,148

* Annual details concealed under 'Unapportioned.'

MAGNESIUM SALTS

Bibliography: State Mineralogist Reports XX, XXI, XXV-XXVI (inc.), XXXIV. Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1938 there was an output of magnesium salts in California coming from one plant each in Alameda and San Diego counties, and two in San Mateo County. This amounted to 24,176 short tons valued at $469,636, and consisted of the chloride, carbonate, hydroxide, and oxide. The 1937 output amounted to 3867 tons worth $316,669, which was also the chloride, carbonate, hydroxide, and oxide. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a substitute for magnesite, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate market in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid

form carrying from 35% to 67% $MgCl_2$ and in part as dry crystals, while that from Alameda and San Mateo counties was magnesium carbonate, magnesium hydroxide, and magnesium oxide, obtained by precipitation from sea water.

The average value reported for the chloride produced in California in 1938 was approximately $28.30 per ton, f.o.b. plant, and in 1937 approximately $29.69 per ton, f.o.b. plant.

Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1916	851	$6,407	1929–1930*	4,914	$333,906
1917	1,064	34,973	1931–1932*	2,749	217,979
1918	1,008	29,955	1933	2,073	159,660
1919	1,616	82,457	1934	2,325	194,642
1920	3,150	107,787	1935	2,785	235,531
1921	4,153	106,140	1936	3,798	347,838
1922	3,036	89,788	1937	3,867	316,669
1923	3,662	116,031	1938	24,176	469,636
1924	4,823	145,883			
1925	4,221	132,553			
1926	4,881	124,470			
1927–1928*	6,241	139,589	Totals	85,393	$3,391,894

* Annual details concealed under 'Unapportioned.'

NITRATES

Bibliography: State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

POTASH

Bibliography: State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.), XXXIV. Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1938 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent K_2O content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1937 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 379,486 long tons, valued at $9,856,201, compared with 701,472 long tons worth $16,794,981 in 1937. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from $36.25 per ton e.i.f. Atlantic and Gulf ports for high grade sulphate (90%-95%), and $16.50 for manure salts (30%).

Plant of American Potash and Chemical Co., at Trona on Searles Lake, San Bernardino County.

Photo by Walter W. Bradley

Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value	Year	Tons	Value
1914	10	$460	1927	67,340	$1,952,852
1915	1,076	19,391	1928	178,680	5,522,350
1916	17,808	663,605	1929		
1917	129,022	4,202,889	1930	172,263	5,500,536
1918	49,381	6,808,976	1931		
1919	28,118	2,415,963	1932	153,147	3,932,721
1920	26,298	1,465,463	1933		
1921	14,806	390,210	1934	355,604	3,750,809
1922	17,776	584,388	1935		
1923	29,597	709,836	1936	358,417	6,988,922
1924	33,107	747,407	1937		
1925	36,355	829,770	1938	*	*
1926	32,884	812,285	Totals	1,600,789	$46,304,833

* Annual details concealed under 'Unapportioned.'

SALT

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIV-XXXV. Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

During 1938 there was an output in California of 395,746 tons of salt worth $1,099,737, compared with 370,431 tons worth $1,044,325 in 1937. There were twelve companies operating plants in 1938; two in San Bernardino County and one each in Alameda, Butte, Imperial, Kern, Los Angeles, Modoc, Monterey, Orange, San Diego, and San Mateo.

The average value reported for salt produced in California during 1938 was $2.78 per ton f.o.b. plant, compared with $2.82 in 1937; $3.08 in 1936; $3.36 in 1935; $3.68 in 1934; and $3.89 in 1933.

Production of Salt in California, by Years.

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	$112,000	1914	223,806	$583,553
1888	30,800	92,400	1915	169,028	368,737
1889	21,000	63,000	1916	186,148	455,695
1890	8,729	57,085	1917	227,825	584,373
1891	20,094	90,303	1918	212,076	806,328
1892	23,570	104,788	1919	233,994	896,963
1893	50,500	213,000	1920	230,638	972,648
1894	49,131	140,087	1921	197,989	832,702
1895	53,031	150,576	1922	223,238	819,187
1896	64,743	153,244	1923	275,979	1,130,670
1897	67,851	157,520	1924	318,800	1,159,137
1898	93,421	170,855	1925	284,068	949,826
1899	82,654	149,588	1926	311,761	1,124,978
1900	89,338	204,754	1927	263,028	639,127
1901	126,218	366,376	1928	340,580	1,024,656
1902	115,208	205,876	1929	392,039	2,665,436
1903	102,895	211,365	1930	347,945	1,167,487
1904	95,968	187,300	1931	330,951	1,233,567
1905	77,118	141,925	1932	256,353	918,480
1906	101,650	213,228	1933	321,312	1,251,024
1907	88,063	310,967	1934	332,194	1,222,810
1908	121,764	281,469	1935	365,711	1,230,480
1909	155,680	414,708	1936	398,249	1,227,505
1910	174,920	395,417	1937	370,431	1,044,325
1911	173,332	324,255	1938	395,746	1,099,737
1912	185,721	383,370			
1913	204,407	462,681	Totals	9,614,695	$31,167,568

SODA

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.), XXXIV. Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1938 included soda ash, trona, and bicarbonates from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona (sesqui-carbonate, a double salt of Na_2CO_3 and $NaHCO_3$) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

The output for 1938 amounted to 178,105 tons valued at $2,023,610, as compared with 153,105 tons worth $1,461,057 in 1937.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.

Soda Production of California, by Years.

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894	1,530	$20,000	1918	20,447	$855,423
1895	1,900	47,500	1919	21,294	721,958
1896	3,000	65,000	1920	32,407	1,164,898
1897	5,000	110,000	1921	14,828	438,996
1898	7,000	154,000	1922	20,084	573,661
1899	10,000	250,000	1923	34,885	764,284
1900	1,000	50,000	1924	32,536	711,796
1901	8,000	400,000	1925	48,625	947,649
1902	7,000	50,000	1926	63,333	1,305,802
1903	18,000	27,000	1927	62,571	1,478,239
1904	12,000	18,000	1928	80,838	1,469,297
1905	15,000	22,500	1929	90,646	1,838,657
1906	12,000	18,000	1930	90,122	1,627,344
1907			1931	78,701	1,217,811
1908	9,600	14,400	1932	58,017	826,369
1909	7,712	11,593	1933	70,598	1,019,130
1910	8,125	11,862	1934	99,380	1,219,561
1911	9,023	52,887	1935	125,504	1,341,045
1912	7,200	37,094	1936	144,314	1,412,788
1913	1,861	24,936	1937	153,685	1,461,057
1914	6,522	115,396	1938	178,105	2,023,610
1915	5,799	83,485			
1916	10,593	264,825			
1917	24,505	928,578	Totals	1,813,290	$27,196,431

CHAPTER SEVEN

BY COUNTIES

Introductory.

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1936 some active production was reported to the State Division of Mines from all of the fifty-eight.

Rank of Counties in Mineral Yield, 1938.

Of the ten leading counties in point of total value of mineral output for 1938, the first five, viz., Los Angeles, Kern, Fresno, Ventura and Orange; also Kings seventh and Santa Barbara ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1938 and is credited with 35% of the State's total mineral value, holding this position since 1923 when it passed Kern, which previously led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (eighth) owes its position to gold; and Sacramento (tenth) to gold.

There were twenty-eight counties having a mineral production valued in excess of a million dollars in 1938, in seven of which petroleum was an important item; in seventeen gold; in six each, natural gas and cement; in two, borates and miscellaneous stone; and in one each potash and soda, diatomite.

In point of variety and diversity San Bernardino County led all others in 1938 with twenty-seven different mineral substances on its commercial list; followed by Los Angeles County with twenty-three; Inyo County with nineteen; Fresno and Kern counties each with seventeen; Riverside County with sixteen; San Diego County with fourteen; Orange, San Luis Obispo, and Santa Barbara counties each with thirteen; Butte, El Dorado, and Placer counties each with twelve; Imperial, Monterey, and Santa Clara counties each with eleven; and Calaveras, Shasta, Siskiyou, and Tuolumne counties each with ten.

No.	County	Value	No.	County	Value
1	Los Angeles	$125,027,054	31	Stanislaus	$845,523
2	Kern	71,528,574	32	San Joaquin	781,907
3	Fresno	30,159,518	33	Napa	637,963
4	Ventura	21,966,416	34	Santa Clara	624,463
5	Orange	21,601,082	35	Imperial	604,227
6	San Bernardino	16,752,866	36	San Diego	535,722
7	Kings	15,410,875	37	San Benito	527,192
8	Nevada	11,667,896	38	Solano	431,677
9	Santa Barbara	10,683,722	39	Mono	349,516
10	Sacramento	5,467,487	40	Lake	281,098
11	Calaveras	4,357,938	41	Tulare	273,199
12	Amador	3,880,444	42	San Luis Obispo	242,500
13	Riverside	3,306,793	43	Sonoma	232,495
14	Merced	2,867,501	44	Marin	189,843
15	Yuba	2,633,138	45	Monterey	187,144
16	Alameda	2,531,600	46	Humboldt	97,181
17	El Dorado	2,207,099	47	Tehama	81,431
18	Butte	2,177,265	48	Glenn	60,138
19	Contra Costa	2,116,285	49	Lassen	59,546
20	San Mateo	2,026,217	50	Yolo	48,232
21	Placer	2,020,042	51	Mendocino	46,378
22	Santa Cruz	1,907,188	52	San Francisco	33,607
23	Shasta	1,791,727	53	Madera	29,916
24	Mariposa	1,588,861	54	Sutter	28,973
25	Inyo	1,583,893	55	Del Norte	15,997
26	Siskiyou	1,510,815	56	Alpine	11,123
27	Trinity	1,493,132	57	Modoc	5,896
28	Tuolumne	1,130,263	58	Colusa	2,884
29	Sierra	905,237			
30	Plumas	878,277		Total value	$380,444,976

ALAMEDA

Land area: 732 square miles.
Population: 475,153 (1930 census).
Location: East side of San Francisco Bay.
County seat: Oakland.
References: State Mineralogist Report XVII : XVIII : XX : XXVI (Oct., 1929).

Alameda, while in no sense one of the 'mining counties,' came sixteenth on the list of counties as to value, with a mineral production for 1938 worth $2,531,600, and had nine different substances. This was an increase over the 1937 output which was valued at $2,476,302.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery)	5,244 tons	$5,532
Miscellaneous stone		1,141,554
Unapportioned*		1,384,514
Total value		$2,531,600

*Includes brick and hollow building-tile, bromine, gypsum as a by-product of chemical reduction of other minerals from sea water (value not included in total), lime, magnesium salts, salt.

ALPINE

Land area: 776 square miles.
Population: 236 (1930 census).
Location: On eastern border of State, south of Lake Tahoe.
County seat: Markleeville.
References: State Mineralogist Report XV : XVII : XVIII : XXVII (Oct., 1931).

Alpine County ranked fifty-sixth in value of output for 1938, which was $11,123, compared with $22,791 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$35
Silver	167 fine ozs.	108
Miscellaneous stone		10,980
Total value		$11,123

AMADOR

Land area: 601 square miles.
Population: 8494 (1930 census).
Location: East-central part of State—Mother Lode District.
County seat: Jackson.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII : (April, 1927) : XXX.

Amador County ranked twelfth as to value of mineral output for 1938, with nine different substances worth $3,880,440, compared with $3,917,866 in 1937.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1930 and 1937 by Nevada only, and in 1931-1936 and 1938 by Nevada and Sacramento.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery)	42,679 tons	$73,422
Copper	5,152 lbs.	505
Gold		3,724,840
Silver	22,536 fine ozs.	14,569
Miscellaneous stone		6,027
Unapportioned*		61,081
Total value		$3,880,444

* Includes brick, coal, lead, volcanic ash.

BUTTE

Land area: 1722 square miles.
Population: 34,010 (1930 census).
Location: North-central portion of State.
County seat: Oroville.
References: State Mineralogist Report XV : XVII : XVIII : XXIV : XXVI (Oct., 1930) : XXXI (Jan., 1936).

Butte County ranked eighteenth in regard to value of mineral output in 1938 and eighth in respect to gold, with twelve different substances, having a total value of $2,177,265 compared with $1,798,992 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$1,882,370
Silver	30,425 fine ozs.	19,669
Miscellaneous stone		270,871
Unapportioned*		4,355
Total value		$2,177,265

* Includes copper, lead, limestone, mineral water, natural gas, platinum, salt, soapstone.

CALAVERAS

Land area: 1027 square miles.
Population: 6009 (1930 census).
Location: East-central portion of State—Mother Lode District.
County seat: San Andreas.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI : XXXII (July, 1936).

Calaveras County ranked eleventh in California in regard to value of mineral output in 1938, fifth in respect to gold, with a total of $4,357,938, as compared with $3,279,250 in 1937.

Commercial production for 1938 consisting of ten different substances, was as follows:

Substance	Amount	Value
Copper	25,374 lbs.	$2,487
Gold		2,906,225
Lead	1,583 lbs.	73
Silver	17,651 fine ozs.	11,411
Miscellaneous stone		38,991
Unapportioned*		1,398,751
Total value		$4,357,938

* Unapportioned includes cement, clay (pottery), mineral water, platinum.

COLUSA

Land area: 1140 square miles.
Population: 10,257 (1930 census).
Location: Sacramento Valley.
County seat: Colusa.
References: State Mineralogist Report XIV : XVII : XVIII : XXV : (April, 1929).

Colusa County ranked fifty-eighth in regard to the value of mineral output in 1938 with two different mineral substances, worth a total of $2,884, as compared with $9,424 in 1937.

Commercial production for 1938 included mineral water and miscellaneous stone.

CONTRA COSTA

Land area: 714 square miles.
Population: 78,554 (1930 census).
Location: East side of San Francisco Bay.
County seat: Martinez.
References: State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands nineteenth on the list in respect to value of mineral output for 1938, with nine different substances worth $2,116,285, as compared with $1,867,309 in 1937.

Commercial production for 1938 was as follows:

Substance	Value
Brick and hollow building tile	$483,961
Miscellaneous stone	433,644
Unapportioned*	1,198,680
Total value	$2,116,285

* Includes cement, clay (pottery), mineral water, quicksilver, silica (glass sand).

DEL NORTE

Land area: 1024 square miles.
Population: 4734 (1930 census).
Location: Extreme northwest corner of State.
County seat: Crescent City.
References: State Mineralogist Report XIV : XVII : XXI (July, 1925) : XXIX (Jan.-April, 1933) : XXXIV.

Del Norte County was in fifty-fifth place as to mineral production for 1938 with four different substances worth $15,296, as compared with $30,647 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$700
Silver	2 fine ozs.	1
Miscellaneous stone		15,296
Total value		$15,997

EL DORADO

Land area: 1753 square miles.
Population: 8303 (1930 census).
Location: East-central portion of the State, northernmost of the Mother Lode counties.
County seat: Placerville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI : XXXIV (July, 1938).

El Dorado, which contains the location where gold in California was first heralded to the world, comes seventeenth on the list of counties ranked according to value for 1938, with twelve different mineral substances worth $2,207,099. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1937 output was valued at $2,607,972.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	40,535 lbs.	$3,972
Gold		1,484,805
Limestone	135,142 tons	304,420
Silver	8,844 fine ozs.	5,717
Miscellaneous stone		64,202
Unapportioned*		343,983
Total value		$2,207,099

* Includes chromite, lead, lime, mineral water, slate, soapstone.

FRESNO

Land area: 5950 square miles.
Population: 144,369 (1930 census).
Location: South-central portion of State.
County seat: Fresno.
References: State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929).

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1938 of seventeen different mineral substances, with a total value of $30,159,518, as compared with the 1937 value of $41,178,791.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$10,955
Natural gas	58,337,848 Mcu.ft.	3,626,724
Petroleum	20,784,106 bbls.	26,201,849
Silver	54 fine ozs.	35
Miscellaneous stone		224,869
Unapportioned*		95,086
Total value		$30,159,518

* Includes brick and hollow building tile, chromite, feldspar, gems (topaz), granite, gypsum, limestone (marl), mineral water, quicksilver, tungsten ore, clay (pottery).

GLENN

Land area: 1259 square miles.
Population: 10,935 (1930 census).
Location: West side of Sacramento Valley.
County seat: Willows.
References: State Mineralogist Report XIV : XVII : XVIII.

Glenn County stands forty-eighth as a mineral producing county of the State for 1938 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1938 totaled $60,138, which is a decrease from $136,368, the 1937 total.

HUMBOLDT

Land area: 3634 square miles.
Population: 43,189 (1930 census).
Location: Northwestern portion of State, bordering on Pacific Ocean.
County seat: Eureka.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925).

Humboldt County ranked forty-sixth in the value of its mineral output among the counties of the State for 1938, with eight different mineral substances valued at $97,181, compared with the 1937 output worth $100,715.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$20,825
Silver	89 fine ozs.	58
Miscellaneous stone		73,705
Unapportioned*		2,593
Total value		$97,181

* Includes brick, clay (pottery), natural gas, platinum.

IMPERIAL

Land area: 4089 square miles.
Population: 60,894 (1930 census).
Location: Extreme southeast corner of the State.
County seat: El Centro.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926) : XXXIV.

Imperial County ranked thirty-fifth in total value of mineral output for 1938, with eleven different mineral substances, worth $604,227, compared with $677,401 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	70,000 lbs.	$6,860
Gold		448,490
Silver	4,331 fine ozs.	2,800
Miscellaneous stone		60,871
Unapportioned*		87,206
Total value		$604,227

* Includes carbon dioxide, gems (Iceland spar), gypsum, mica, salt, kyanite.

INYO

Land area: 10,019 square miles.
Population: 6557 (1930 census).
Location: Lies on eastern border of State, north of San Bernardino County.
County seat: Independence.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII: XXX : XXXIII : XXXIV (Oct., 1938).

Inyo County's mineral output for 1938 reached a total value of $1,583,893, having nineteen different mineral substances and standing twenty-fifth amount the counties of the State as to value of production. The 1937 yield was worth $1,439,009.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	65,844 lbs.	$6,453
Gold		625,240
Lead	322,004 lbs.	14,812
Pumice and volcanic ash	2,061 tons	19,922
Talc	18,581 tons	194,588
Silver	41,118 fine ozs.	26,581
Miscellaneous stone		32,026
Unapportioned*		664,271
Total value		$1,583,893

* Includes borates, dolomite, garnets, iron ore, limestone, onyx, quicksilver, slate, soda, sulphur, tungsten ore.

KERN

Land area: 8003 square miles.
Population: 82,219, (1930 census).
Location: South-central portion of State.
County seat: Bakersfield.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1938, for which petroleum is responsible; it also rates fourth as a gold producing county. The 1938 production consisted of seventeen different mineral substances valued at $71,528,574, compared with the 1937 output worth $74,162,134.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery and rotary drilling mud)	38,910 tons	$64,821
Gold		3,034,605
Lead	6,994 lbs.	322
Natural gas	68,974,794 M.cu.ft.	4,244,897
Petroleum	66,033,496 bbls.	58,803,255
Silver	1,148,177 fine ozs.	742,256
Miscellaneous stone		240,750
Unapportioned*		4,397,668
Total value		$71,528,574

* Includes borates, brick, calcium silicate, cement, volcanic ash, quicksilver, salt, copper.

KINGS

Land area: 1559 square miles.
Population: 25,277 (1930 census).
Location: South-central portion of the State.
County seat: Hanford.
References: State Mineralogist Report XIV : XVII : XVIII : XXVI (Oct., 1930).

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930 and 1938, third in 1931, and eighth in 1936-1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas	53,242,662 M.cu.ft.	$3,290,978
Petroleum	8,717,827 bbls.	12,117,779
Unapportioned*		2,118
Total value		$15,410,875

* Includes quicksilver and miscellaneous stone.

LAKE

Land area: 1278 square miles.
Population: 7166 (1930 census).
Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.
County seat: Lakeport.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929) : XXXIV.

Lake County was in fortieth place as to the value of mineral output for 1938, with three different mineral substances, worth $281,098, compared with $392,585 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Mineral water	26,560 gals.	$12,770
Quicksilver	3,718 flasks	265,430
Miscellaneous stone		2,898
Total value		$281,098

LASSEN

Land area: 4531 square miles.
Population: 12,587 (1930 census).
Location: Northeast portion of State.
County seat: Susanville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in forty-ninth place as a mineral producer for 1938, with an output of $59,546, compared with $86,240 which was the value for the previous year.

Commercial production for 1938 was as follows:

Substance	Value
Miscellaneous stone	$59,118
Unapportioned	428
Total value	$59,546

* Includes granite, gold, silver.

LOS ANGELES

Land area: 4067 square miles.
Population: 2,201,526 (1930 census).
Location: One of the southwestern coast counties.
County seat: Los Angeles.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937) : XXXIV.

The mineral production for Los Angeles County for the year 1938 amounted in value to $125,027,054, as compared with the 1937 output worth $100,337,635. This accounted for 35% of the entire State's

total for 1938 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1938, consisting of twenty-three substances, was as follows:

Substance	Amount	Value
Brick	60,367 M.	$1,206,092
Hollow building tile	3,022 tons	31,141
Clay (pottery)	30,766 tons	55,605
Copper	2,128 lbs.	209
Gold		171,710
Mineral water	8,398,855 gals.	349,028
Natural gas	73,790,818 M. cu.ft.	5,451,390
Petroleum	106,545,794 bbls.	113,407,606
Silver	1,887 fine ozs.	1,220
Stone, miscellaneous		3,836,394
Unapportioned*		516,659
Total value		$125,027,054

* Includes bentonite, diatomite, dolomite, granite (mica schist), iodine, limestone, marble (lime rock building stone) salt, slate, soapstone, lead.

MADERA

Land area: 2112 square miles.
Population: 17,152 (1930 census).
Location: East-central portion of State.
County seat: Madera.
References: State Mineralogist Report XIV : XVII : XVII : XXIV (Oct., 1928) : XXX : XXXI.

Madera County was in fifty-third place as a mineral producer for 1938, with an output of four different mineral substances valued at $29,916, compared with $133,165 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$9,485
Silver	86 fine ozs.	56
Miscellaneous stone		2,875
Other minerals		17,500
Total value		$29,916

MARIN

Land area: 529 square miles.
Population: 41,635 (1930 census).
Location: Adjoins San Francisco on the north.
County seat: San Rafael.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX.

Marin County had forty-fourth place as to the value of mineral output for 1938, with four different mineral substances. The total was 189,843, compared with $300,204 in 1937.

Commercial production for 1938 included pottery clay, mineral water, and miscellaneous stone.

MARIPOSA

Land area: 1453 square miles.
Population: 2530 (1930 census).
Location: Most southerly of the Mother Lode counties. East central portion of State.
County seat: Mariposa.
References: State Mineralogist Report XIV : XVII : XVIII : XXIV (April 1928) : XXXI (Jan., 1935).

Mariposa County is one of the distinctly 'mining' counties of the State, although it stands but twenty-fourth on the list of counties in regard to the value of its mineral output for 1938, with a total of $1,588,861, as compared with $1,270,774 for 1937. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production with eight different mineral substances, for 1938 was as follows:

Substance	Amount	Value
Copper	4,328 lbs.	$424
Gold		1,081,815
Silver	7,973 fine ozs.	5,154
Miscellaneous stone		282.030
Unapportioned*		219,438
Total value		$1,588,861

* Includes barite, lead, granite.

MENDOCINO

Land area: 3452 square miles.
Population: 23,491 (1930 census).
Location: Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.
County seat: Ukiah.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX.

Mendocino County's mineral output for 1938 was valued at $46,378 which gave it a rank of fifty-first among the counties of the State as a mineral producer with $114,705 for 1937.

Commercial production for 1938 included natural gas and miscellaneous stone.

MERCED

Land area: 1995 square miles.
Population: 36,900 (1930 census).
Location: About the geographical center of the State.
County seat: Merced.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935).

Merced County ranked fourteenth as to the value of mineral output for 1938, with six different substances worth $2,867,501, compared with $2,535,126 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$2,090,340
Silver	5,859 fine ozs.	3,788
Miscellaneous stone		139,637
Other minerals		633,736
Total value		$2,867,501

MODOC

Land area: 3823 square miles.
Population: 8038 (1930 census).
Location: The extreme northeast corner of the State.
County seat: Alturas.
References: State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Modoc County, in fifty-seventh place for 1938, with seven different mineral substances, reported a commercial production as follows:

Substance	Value
Miscellaneous stone	$4,329
Unapportioned*	1,567
Total value	$5,896

* Includes gems (irridescent obsidian), mineral water, salt, gold, silver.

MONO

Land area: 3030 square miles.
Population: 1359 (1930 census).
Location: Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.
County seat: Bridgeport.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX : XXXIV.

Mono County, in thirty-ninth place with nine different mineral substances, reported a commercial production for 1938 as follows:

Substance	Amount	Value
Copper	3,050 lbs.	$299
Gold		117,390
Lead	6,039 lbs.	278
Silver	220,978 fine ozs.	142,854
Miscellaneous stone		4,121
Unapportioned*		84,574
Total value		$349,516

* Includes clay (pottery), pumice, andalusite, tungsten ore.

MONTEREY

Land area: 3330 square miles.
Population: 53,668 (1930 census).
Location: West-central portion of State, bordering on Pacific Ocean.
County seat: Salinas.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI : XXXIV.

Monterey County eleven different mineral substances during 1938, having a total value of $187,144, as compared with $262,651 for 1937.

In forty-fifth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$2,135
Silver	5 fine ozs.	3
Miscellaneous stone		151,888
Unapportioned*		33,118
Total value		$187,144

* Includes diatomite, gems (jasper), natural gas, quicksilver, salt, sandstone, silica (glass sand).

NAPA

Land area: 783 square miles.
Population: 22,832 (1930 census).
Location: Directly north of San Francisco Bay—one of the 'bay counties.'
County seat: Napa.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929).

In 1938 the value of Napa County's mineral output was $637,963, placing it in thirty-third place on the list of counties, as compared with $356,146 for 1937.

With nine different mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	4,450 lbs.	$436
Gold		64,260
Mineral water	53,152 gals.	9,658
Quicksilver	694 flasks	46,403
Silver	148,337 fine ozs.	95,895
Unapportioned*		421,311
Total value		$637,963

* Includes pumice, sandstone, miscellaneous stone.

NEVADA

Land area: 974 square miles.
Population: 10,589 (1930 census).
Location: North of Lake Tahoe on the eastern border of the State.
County seat: Nevada City.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII.

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1938, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands eighth on the list of counties in regard to value of its mineral output for 1938, with nine different mineral substances worth $11,667,896, as compared with $11,385,056 for 1937. The increase was due to gold.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	124,058 lbs.	$12,158
Gold		11,261,530
Lead	286,396 lbs.	13,174
Silver	505,156 fine ozs.	326,565
Miscellaneous stone		44,758
Unapportioned*		9,711
Total value		$11,667,896

* Includes barite, granite, platinum.

ORANGE

Land area: 795 square miles.
Population: 118,611 (1930 census).
Location: Southwest poriton of the State, bordering Pacific Ocean.
County seat: Santa Ana.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI.

Orange County, in fifth place as to value of mineral output for 1938, produced thirteen mineral substances, worth $21,601,082, as compared with $22,659,380 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery)	22,522 tons	$89,954
Gold		245
Natural gas	20,551,546 M.cu.ft.	1,510,990
Petroleum	20,667,775 bbls.	19,768,434
Silver	682 fine ozs.	441
Miscellaneous stone		201,444
Unapportioned*		29,574
Total value		$21,601,082

* Includes brick, lead, quicksilver, salt, silica (glass sand), copper.

PLACER

Land area: 1395 square miles.
Population: 24,442 (1930 census).
Location: Eastern border of State directly west of Lake Tahoe.
County seat: Auburn.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1937) : XXXI : XXXII (Jan., 1936).

Placer County in twenty-first place, with twelve different mineral substances, had a commercial production for 1938 as follows, compared with $1,754,040 for the previous year:

Substance	Amount	Value
Clay (pottery)	60,708 tons	$85,337
Copper	7,704 lbs.	755
Gold		1,805,965
Lead	15,300 lbs.	704
Silver	43,226 fine ozs.	27,944
Miscellaneous stone		54,148
Unapportioned*		45,189
Total value		$2,020,042

* Includes brick and hollow building tile, chromite, granite, mineral water, platinum.

PLUMAS

Land area: 2594 square miles.
Population: 7909 (1930 census).
Location: Northeastern border of State, south of Lassen County.
County seat: Quincy.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937).

Plumas County's mineral output for 1938 with seven different mineral substances, was valued at $878,277, as compared with $2,354,957 for 1937.

In thirtieth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	1,202,974 lbs.	$117,891
Gold		698,110
Lead	2,276 lbs.	105
Silver	53,927 fine ozs.	34,862
Miscellaneous stone		27,159
Other minerals		150
Total value		$878,277

RIVERSIDE

Land area: 7240 square miles.
Population: 82,078 (1930 census).
Location: Southern portion of State.
County seat: Riverside.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI : XXXIV.

Riverside is the fourth county in the State in size and the thirteenth in regard to the total value of mineral output for 1938. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed sixteen different mineral substances commercially produced in 1938 with a total value of $3,306,793, compared with the 1937 output which was valued at $4,057,127.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery)	47,977 tons	$87,489
Gold		77,000
Copper	15,044 lbs.	1,479
Lead	241,510 lbs.	11,109
Silver	5,238 fine ozs.	3,387
Miscellaneous stone		319,796
Unapportioned*		2,806,533
Total value		$3,306,793

* Includes alunogen, brick and hollow building tile, cement, granite, gypsum, limestone, mineral water, silica (glass sand), paving block.

SACRAMENTO

Land area: 983 square miles.
Population: 141,915 (1930 census).
Location: North-central portion of State.
County seat: Sacramento.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands tenth among the counties of the State as a mineral producer; the output, principally gold, for 1938 being valued at $5,467,487, as compared with the 1937 production worth $4,230,689. In regard to gold output alone, this county ranks second, being exceeded by Nevada, the Sacramento product coming from the dredges. With nine mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$4,973,640
Silver	6,236 fine ozs.	4,031
Miscellaneous stone		376,159
Unapportioned*		113,657
Total value		$5,467,487

* Includes brick and hollow building tile, granite, natural gas, platinum, paving block.

SAN BENITO

Land area: 1392 square miles.
Population: 11,310 (1930 census).
Location: West-central portion of State.
County seat: Hollister.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (April, 1926) : XXXIV.

San Benito County ranked thirty-seventh among the counties in regard to the value of total mineral production for 1938, having an output worth $527,192, as compared with $504,510 for the previous year.

Commercial production for 1938 included bentonite, coal, dolomite, quicksilver, miscellaneous stone.

SAN BERNARDINO

Land area: 20,157 square miles.
Population: 133,827 (1930 census).
Location: Southeastern portion of State.
County seat: San Bernardino.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX : XXXIV.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1938, with a total of $16,752,866, as compared with the 1937 total of $16,012,330.

San Bernardino, for several years (except for 1918) has led all other counties in the State in point of variety of minerals, producing commercially in 1938 a total of twenty-seven different substances.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Bentonite	8,504 tons	$108,850
Clay (pottery)	3,651 tons	26,249
Copper	24,723 lbs.	2,423
Gold		409,290
Lead	88,888 lbs.	4,089
Silver	257,370 fine ozs.	166,381
Miscellaneous stone		279,518
Unapportioned*		15,756,066
Total value		$16,752,866

*Includes borates, brick, calcium chloride, cement, granite, iron ore, lithia, lime, limestone, onyx, mineral water, petroleum, potash, silica ('ganister' used in brick), salt, serpentine, soda, tungsten ore, zinc.

SAN DIEGO

Land area: 4221 square miles.
Population: 209,477 (1930 census).
Location: Extreme southwest corner of State.
County seat: San Diego.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925) : XXX : XXXV (Jan., 1939).

San Diego County ranked thirty-sixth in the total value of its mineral output for the year 1938 with fourteen different mineral substances on the commercial list. The value for 1938 was $535,722 as compared with the 1937 output worth $591,479.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	7,023 lbs.	$688
Gold		3,080
Silver	31 fine ozs.	20
Miscellaneous stone		285,223
Unapportioned*		246,711
Total value		$535,722

* Includes brick and hollow building tile, bromine, clay (pottery), feldspar, gems (kunzite and tourmaline), granite, magnesium salts, mineral water, salt.

SAN FRANCISCO

Land area: 46½ square miles.
Population: 637,212 (1930 census).
County seat: San Francisco.
Reference: State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, and mineral water.

In fifty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$2,590
Silver	5 fine ozs.	3
Unapportioned*		31,014
Total value		$33,607

* Includes mineral water and miscellaneous stone.

SAN JOAQUIN

Land area: 1448 square miles.
Population: 102,871 (1930 census).
Location: Central portion of State.
County seat: Stockton.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1938 having a total value of $781,907, as compared with $706,620 for 1937. In thirty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$41,580
Natural gas	5,720,352 M.cu.ft.	503,667
Miscellaneous stone		175,530
Silver	92 fine ozs.	59
Other minerals		61,071
Total value		$781,907

SAN LUIS OBISPO

Land area: 3334 square miles.
Population: 29,617 (1930).
Location: Bordered by Kern County on the east and the Pacific Ocean on the west.
County seat: San Luis Obispo.
References: State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935).

The total value of the mineral production of San Luis Obispo County in 1938, with thirteen different mineral substances, was $242,500, as compared with $323,691 in 1937.

In forty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Miscellaneous stone		$19,150
Quicksilver	1,114 flasks	77,938
Unapportioned*		145,412
Total value		$242,500

* Includes brick and hollow building tile, clay (pottery and oil well drilling mud), limestone, marble (lime rock building stone), mineral water, petroleum, volcanic ash, sandstone, gold, silver.

SAN MATEO

Land area: 447 square miles.
Population: 77,338 (1930 census).
Location: Peninsula, adjoined by San Francisco on the north.
County seat: Redwood City.
References: State Mineralogist Report XVII : XVIII : XXV : (April, 1929) : XXIX.

San Mateo County had a mineral output in 1938 of seven different substances, having a total value of $2,026,217, as compared with the 1937 production worth $2,310,784.

In twentieth place, commercial production for 1938 was as follows: cement, limestone (shells), magnesium salts, petroleum, salt, miscellaneous stone.

SANTA BARBARA

Land area: 2740 square miles.
Population: 65,075 (1930 census).
Location: Southwestern portion of State, adjoining San Luis Obispo on the south.
County seat: Santa Barbara.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1938 was $10,683,722, as compared with the 1937 output of $10,709,056.

With thirteen different substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas	4,655,732 M.cu.ft.	$327,466
Petroleum	9,555,145 bbls.	9,309,262
Quicksilver	104 flasks	7,179
Unapportioned*		1,039,815
Total value		$10,683,722

* Includes bituminous rock, brick and hollow building tile, clay (pottery), diatomite, granite (volcanic rock), marble (lime rock building stone), mineral water, miscellaneous stone.

SANTA CLARA

Land area: 1328 square miles.
Population: 144,921 (1930 census).
Location: West-central portion of State.
County seat: San Jose.
References: State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX.

Santa Clara County reported a mineral output for 1938 of $624,463, as compared with the 1937 figure of $722,903.

In thirty-fourth place with eleven mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Brick	23,270 M.	$236,295
Limestone (shells)	98,944 tons	128,793
Quicksilver	283 flasks	19,883
Miscellaneous stone		213,636
Gold		35
Silver	1 fine oz.	1
Unapportioned*		25,820
Total value		$624,463

* Includes clay (pottery), gems (jasper), magnesite, petroleum.

SANTA CRUZ

Land area: 435 square miles.
Population: 37,405 (1930 census).
Location: Bordering Pacific Ocean, just south of San Mateo County.
County seat: Santa Cruz.
References: State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of San Cruz County, a portion of which is itemized below, amounted to a total of $1,907,188 for 1938, giving the county a standing of twenty-second among all others in the State in this regard. The 1937 figure was $2,074,463.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Miscellaneous stone		$91,422
Gold		350
Silver	2 fine ozs.	1
Unapportioned*		1,815,415
Total value		$1,907,188

* Includes bituminous rock, cement, iron ore, lime, limestone.

SHASTA

Land area: 3858 square miles.
Population: 13,925 (1930 census).
Location: North-central portion of State.
County seat: Redding.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV.

Shasta County stood twenty-third in California among the mineral-producing counties in 1938, with an output valued at $1,791,727, as compared with the 1937 production worth $2,199,423.

With ten mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$1,439,620
Silver	28,771 fine ozs.	18,599
Miscellaneous stone		80,520
Unapportioned*		252,988
Total value		$1,791,727

* Includes granite (volcanic rock), platinum, pyrite, sandstone, lead, copper.

SIERRA

Land area: 923 square miles.
Population: 2419 (1930 census).
Location: Eastern border of State just north of Nevada County.
County seat: Downieville.
References: State Mineralogist Report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of $905,237 in 1938 which was mainly gold, as compared with the 1937 output worth $974,680.

In twenty-ninth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$900,480
Lead	17,608 lbs.	810
Silver	4,809 fine ozs.	3,109
Unapportioned*		838
Total value		$905,237

* Includes miscellaneous stone, copper.

SISKIYOU

Land area: 6256 square miles.
Population: 25,505 (1930 census).
Location: Extreme north-central portion of State, next to Oregon boundary.
County seat: Yreka.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935) : XXXIV.

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-sixth in regard to mineral output with ten mineral substances for 1938. The 1937 production was valued at $1,200,351.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$1,294,230
Silver	5,159 fine ozs.	3,335
Miscellaneous stone		116,331
Unapportioned*		96,919
Total value		$1,510,815

* Includes copper, lead, mineral water, platinum, pumice, tube mill pebbles.

SOLANO

Land area: 822 square miles.
Population: 40,807 (1930 census).
Location: Touching San Francisco Bay on the northeast.
County seat: Fairfield.

Solano, while mostly valley land, produced mineral substances during the year 1938 to the total value of $431,677, ranking it thirty-eighth among the counties of the State, compared with the 1937 output worth $145,567.

Commercial production for 1938 included natural gas, quicksilver, and miscellaneous stone.

SONOMA

Land area: 1577 square miles.
Population: 62,248 (1930 census).
Location: South of Mendocino County, bordering on the Pacific Ocean.
County seat: Santa Rosa.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Sonoma County ranked forty-third among the counties of California during 1938 with a mineral output valued at $232,495, as compared with the 1937 figure of $273,063.

Commercial production during 1938 was as follows:

Substance	Amount	Value
Mineral water	23,604 gals.	$4,365
Quicksilver	425 flasks	29,641
Unapportioned*		198,489
Total value		$232,495

* Includes clay (pottery), granite (tuffa), miscellaneous stone.

STANISLAUS

Land area: 1450 square miles.
Population: 56,624 (1930 census).
Location: Center of State, bounded on south by Merced County.
County seat: Modesto.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1938 ranked thirty-first in the State in regard to minerals, with an output valued at $845,523, as compared with $940,030 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$453,250
Silver	1,332 fine ozs.	861
Miscellaneous stone		290,036
Unapportioned*		101,376
Total value		$845,523

* Includes clay (pottery), magnesite, platinum.

SUTTER

Land area: 608 square miles.
Population: 14,618 (1930 census).
Location: Bounded by Butte County on the north and Sacramento on the south.
County seat: Yuba City.
References: State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral substance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937-1938.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1938 there was a commercial output of pottery clay, natural gas, and miscellaneous stone, having a total value of $28,973.

TEHAMA

Land area: 2893 miles.
Population: 13,839 (1930 census).
Location: North-central portion of the State, bounded on the north by Shasta.
County seat: Red Bluff.
References: State Mineralogist Report XV : XVII : XVIII : XIV : XXIV (July, 1928).

Tehama County stood forty-seventh among the mineral-producing counties of the State for 1938, with an output valued at $81,431, as compared with the 1937 yield worth $65,193.

Commercial production in 1938 included gold, platinum, silver, and miscellaneous stone.

TRINITY

Land area: 3166 square miles.
Population: 2811 (1930 census).
Location: Northwestern portion of State.
County seat: Weaverville.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV.

Trinity County's 1938 output of minerals was valued at $1,493,132, as compared with the 1937 figure of $721,290, mainly due to gold which gives the county a rank of twenty-seventh for the year.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$1,451,345
Silver	4,628 fine ozs.	2,992
Miscellaneous stone		36,456
Unapportioned*		2,339
Total value		$1,493,132

* Includes coal and platinum.

TULARE

Land area: 4856 square miles.
Population: 77,375 (1930 census).
Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.
County seat: Visalia.
References: State Mineralogist Report XV : XVII : XVIII : XX.

Tulare County stands forty-first on the list of mineral producing counties for 1938, with eight different mineral substances, having a total value of $273,199, as compared with the 1937 figure of $314,952.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$1,400
Silver	19 fine ozs.	12
Miscellaneous stone		151,788
Unapportioned*		119,999
Total value		$273,199

* Includes brick and hollow building tile, natural gas, petroleum, tungsten ore.

TUOLUMNE

Land area: 2190 square miles.
Population: 9239 (1930 census).
Location: East-central portion of State—Mother Lode District.
County seat: Sonora.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928) : XXXIV.

Tuolumne County ranks twenty-eighth among the counties of the State relative to its total value of mineral output for 1938 with ten different substances. This county ranks first as a producer of marble in the State. The mineral production for 1938 was valued at $1,130,263, as compared with $1,012,180 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper	2,899 lbs.	$284
Gold		854,490
Silver	7,029 fine ozs.	4,544
Miscellaneous stone		84,568
Unapportioned*		186,377
Total value		$1,130,263

* Includes lead, granite, lime, limestone, slate

VENTURA

Land area: 1878 square miles.
Population: 54,577 (1930 census).
Location: Southwestern portion of State, bordering on Pacific Ocean.
County seat: Ventura.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932).

Ventura is fourth in the State in respect to the value of its mineral output for 1938. The 1938 mineral production was worth $21,966,416, as compared with the 1937 output valued at $19,230,720.

With nine different mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas	43,239,220 M. cu. ft.	$2,990,127
Petroleum	16,979,962 bbls.	18,707,689
Miscellaneous stone		256,199
Gold		665
Silver	5 fine ozs.	3
Unapportioned*		11,733
Total value		$21,966,416

* Includes clay (rotary drilling mud) and granite.

YOLO

Land area: 1017 square miles.
Population: 23,618 (1930 census).
Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.
County seat: Woodland.
References: State Mineralogist Report XIV : XVII : XVIII.

Yolo County, in fiftieth place, had a commercial production for 1938 as follows, compared with $44,171 the preceding year:

Substance	Value
Miscellaneous stone	$44,598
Unapportioned*	3,634
Total value	$48,232

* Includes natural gas and quicksilver.

YUBA

Land area: 639 square miles.
Population: 11,327 (1930 census).
Location: Lies west of Sierra and Nevada counties; south of Plumas.
County seat: Marysville.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked fifteenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredges. The 1937 output was valued at $2,587,748.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold		$2,461,935
Silver	8,349 fine ozs.	5,397
Miscellaneous stone		163,628
Other minerals		2,178
Total value		$2,633,138

CHAPTER VIII

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1938

NOTE.—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1938 (Vol. 24, No. 2).

ALUM (Natural)

Operator	Address	Location of mine
Riverside County		
Nicholas Baxter	1316 Perris St., San Bernardino	Corona

BARYTES

Operator	Address	Location of mine
Mariposa County		
National Lead Co., National Pigments & Chemical Division	722 Chestnut St., St. Louis, Mo.	El Portal
Nevada County		
Industrial Minerals & Chemical Co.	836 Gilman St., Berkeley	Nevada City

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
Los Angeles County		
Pomona Tile Mfg. Co.	Pomona	Pomona
San Benito County		
D. L. Stewart Property, A. P. Stewart, Lessee	1052 Vermont St., San Jose	Tres Pinos
San Bernardino County		
Walter Becker	Box 43, Red Mountain	Red Mountain
William M. Hewson	Box 336, Oro Grande	Oro Grande
National Lead Co., National Pigments & Chemical Div.	983 Wilson, Los Angeles	Hector
J. H. Stone	Barstow	Barstow
Velvet-White Mines, B. Driscoll	4721 Second Ave., Los Angeles	Oro Grande

BITUMINOUS ROCK

Operator	Address	Location of mine
Santa Barbara County		
Higgins Quarry, D. A. Sattler, Lessee	856 Arguello Rd., Santa Barbara	Carpinteria
Santa Cruz County		
Calrock Asphalt Co.	525 Market St., San Francisco	Majors

BORATES

Operator	Address	Location of mine
Inyo County		
Pacific Alkali Co.	1209 Pacific Mutual Bldg., Los Angeles	Bartlett
Kern County		
Pacific Coast Borax Co.	510 W. 6th St., Los Angeles	Kramer
San Bernardino County		
American Potash and Chemical Corp.	Trona	Trona
West End Chemical Co.	Latham Square Bldg., Oakland	Searles Lake

BROMINE

Operator	Address	Location of mine
Alameda County		
Westvaco Chlorine Prod. Corp.	Newark	Newark
San Diego County		
Westvaco Chlorine Prod. Corp	Newark	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
San Bernardino County		
California Rock Salt Co.	2465 Hunter St., Los Angeles	Amboy
Hollar Chemical, Inc.	2000 Santa Fe Ave., Los Angeles	Funston

CARBON DIOXIDE GAS

Operator	Address	Location of wells
Imperial County		
National Dry Ice Co.	Niland	Niland
Pacific-Imperial Dri-Ice, Inc., Carl M. Einhart, Pres.	Niland	Niland

CEMENT

Operator	Address	Location of mill
Calaveras County		
Calaveras Cement Co.	315 Montgomery St., San Francisco	San Andreas
Contra Costa County		
Henry Cowell Lime and Cement Co.	2 Market St., San Francisco	Cowell
Kern County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Monolith
Los Angeles County		
Blue Diamond Corp.	1650 S. Alameda St., Los Angeles	Los Angeles
Merced County		
Yosemite Portland Cement Co.	Merced	Merced
Riverside County		
Riverside Cement Co.	621 S. Hope St., Los Angeles	Riverside
San Bernardino County		
California Portland Cement Co.	601 W. Fifth St., Los Angeles	Colton
Southwestern Portland Cement Co.	503 Roosevelt Bldg., Los Angeles	Victorville
San Mateo County		
Pacific Portland Cement Co.	111 Sutter St., San Francisco	Redwood City
Santa Cruz County		
Santa Cruz Portland Cement Co.	Crocker Bldg., San Francisco	Davenport

CHROMITE

Operator	Address	Location of mine
El Dorado County		
U. S. Chrome Mines, Inc., Alwyn H. Wild	2240 Hyde St., San Francisco	Folsom
Fresno County		
Bradley & Ekstrom	320 Market St., San Francisco	Tollhouse
Placer County		
Daniel Sullivan	Alta	Dutch Flat

CLAY—1938

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Alameda County			
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	116 Natomas St., San Francisco	Alameda
Interlocking Tile Co.	a, c	Niles	Niles
Kraftile Co.	a, b	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Technical Porcelain and China Ware Co.	a	420 Kains Ave., Albany via Berkeley	Albany
Walrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works	a	62d and Green Sts., Emeryville	Emeryville
Woolenius Tiles & Mantels	a	1315 2d St., Berkeley	Berkeley
Amador County			
M. J. Bacon	c	Ione	Carbondale
Cal. Mineral Products Co., Ione Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Ione
N. Clark & Sons	c	116 Natomas St., San Francisco	Ione
Clay Corp. of California	c	1267 Russ Bldg., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b	1267 Russ Bldg., San Francisco	Ione
Calaveras County			
California Pottery Co.	c	Niles	Valley Springs
Contra Costa County			
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Port Costa Brick Works, C. G. Berg, Pres.	b, c	6th and Berry Sts., San Francisco	Port Costa
Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W, Richmond	Richmond
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
United Materials & Richmond Brick Co., Ltd.	b	Box 7, Richmond	Richmond
Fresno County			
Craycroft Brick Co.	a, b	Griffith-McKenzie Bldg., Fresno	Fresno
Humboldt County			
D. J. Thompson Brick Co.	a, b, c	Box 16, Myrtle Ave., Eureka	Eureka
Kern County			
American Minerals Co.	c	2808 S. Pacific, San Pedro	Cantil
Bakersfield Rock & Gravel Co.	d	Box 395, Sta. A, Bakersfield	Bakersfield
Bakersfield Sandstone Brick Co., James Curran, Mgr.	b	Bakersfield	Bakersfield
C. W. Hartman	d	Bakersfield	Bakersfield
King Lumber Co.	b	1402 King St., Bakersfield	Bakersfield
Mojave Corp.	d	Box 174, Los Nietos	Muroc

Los Angeles County			
Alhambra Kilns, Inc., L. C. Merwin	a	Alhambra	Alhambra and Santa Monica
American Refractories Co.	a, b	3932 E. Pico Blvd., Los Angeles	Los Angeles
Angulo Tile Co., L. R. H. and W. H. Angulo	a	Reseda, Los Angeles County	Reseda
J. A. Bauer Pottery Co.	a	415 W. Ave. 33, Los Angeles	Los Angeles
J. Booth	a, c	1775 Stanford, Santa Monica	Santa Monica
Builders Brick Co., Ltd.	b	177th and Western Aves., Moneta	Moneta and Compton
Ceramic Corp.	a	4010 Whiteside St., Los Angeles	Los Angeles
City Brick Co.	b	1900 W. Manchester, Los Angeles	Los Angeles
Claycroft Potteries, Fred H. Robertson	a	3101 San Fernando Blvd., Los Angeles	Los Angeles
H. F. Coors Co., Inc.	a	Inglewood	Inglewood
Davidson Brick Co.	b, c	4701 Floral Dr., Los Angeles	Los Angeles
Eljer California Co.	a	4100 Alameda, Los Angeles	Arcadia
Emsco Refractories Co.	a, b	5601 S. Boyle Ave., Vernon	Vernon
Gladding, McBean & Co., Tropico, L. A. & S. M. Plants	a, b, c	2901 Los Feliz Blvd., Los Angeles	Tropico, Los Angeles, Santa Monica, Hermosa Beach and Vernon
Higgins Brick & Tile Works	a, b, c	Box 525, Moneta	Moneta
Italian Terra Cotta Co.	a	1149 Mission Rd., Los Angeles	Los Angeles
Long Beach Brick Co., Inc., H. A. Havner, Mgr.	b	422 E. Broadway, Long Beach	Long Beach
Markoff Mosaic Tile Corp.	a	1107 E. Redondo Blvd., Inglewood	Inglewood
Pacific Clay Products	a, b, c	Box 145, Sta. A, Los Angeles	Los Angeles and Los Nietos
Pacific Tile & Porcelain Co.	a	3428 W. Pico Blvd., Los Angeles	Los Angeles and Los Nietos
Pomona Brick Co., Wm. McMullen, Mgr.	b	Pomona	Pomona
Pomona Tile Mfg. Co.	a, c	Pomona	Pomona
San Vallee Tile Kilns, R. F. Stubver, Mgr.	a, c	6601 Wilbur, Reseda	Reseda
St. Louis Fire Brick and Clay, Joseph Mesmer	b	3050 E. Slauson St., Los Angeles	Los Angeles
Simons Brick Co., Walter R. Simons	a, b, c	1195 S. Boyle Ave., Los Angeles	Los Angeles
Tillotson Clay Products	a, b	3363 Fruitland Rd., Vernon	Vernon
Vernon Potteries	a	2300 E. 52d St., Los Angeles	Vernon
Vitrefrax Co.	a, b, c	5050 Pacific Blvd., Los Angeles	Los Angeles
Marin County			
McNear Brick Co.	a, c	McNear Point, San Rafael	McNear
Mono County			
California Kaolin Co.	c	811 W. 7th St., Los Angeles	Casa Diablo
Orange County			
Arnold Clay Mine, I. P. Arnold	c, f	1846 W. 83d St., Los Angeles	El Toro
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Gypsum
La Bolsa Tile Co.	a, c	R.F.D. 1, Box 174, Huntington Beach	Smeltzer
Mission Clay Products Co	a, b, c	Olive	Olive
Pacific Clay Products	c	Box 145, Sta. A, Los Angeles	El Toro
Tierra Colorado Clay Co.	c	Box 473, San Juan Capistrano	San Juan Capistrano

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.

CLAY—1938—Continued

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Placer County			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	2901 Los Feliz Blvd., Los Angeles	Lincoln
Lincoln Clay Products Co., M. J. Dillman, Mgr.	c	Lincoln	Lincoln
Riverside County			
Alberhill Coal and Clay Co.	c	2406 E. 58th St., Los Angeles	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	650 Chamber of Commerce Bldg., Los Angeles	Corona
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Temescal
Sacramento County			
Cannon & Co.	a, b	Box 802, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, Owner	a	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.*	a	R.F.D. 4, Box 1478, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1300 Front St., Sacramento	Sacramento
San Benito County			
D. L. Stewart Property, A. P. Stewart, Lessee	c	1052 Vermont, San Jose	Tres Pinos
San Bernardino County			
Mr. Walter Becker	c	Box 43, Red Mountain	Red Mountain
Chamberlain Co., Inc.	c	2550 E. 9th St., Los Angeles	Olancha
Hancock Brick Yard, C. P. Hancock & Son	b	4330 Lemon St., Riverside	Highgrove
Hart Clay Co., W. K. Skeoch, Lessor	c	2022 Thayer Ave., Los Angeles	Goffs
William M. Hewson	c	Box 336, Oro Grande	Oro Grande
Kennedy Clay Pit, John Kennedy	c	1306¾ Warren Ave., Los Angeles	Daggett
National Lead Co., Pigments & Chemical Div.	c	983 Wilson, Los Angeles	Hector
Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr.	c	Campo	Hart
J. H. Stone	c	Barstow	Barstow
Temescal Clay Co.	g	5601 S. Boyle Ave., Vernon	Hicks
Velvet-White Mines, B. Driscoll	c, e	4721 Second Ave., Los Angeles	Oro Grande
San Diego County			
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	Farr Station
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
Vitrified Products Corp.	a, b, c	2841 Jefferson St., North San Diego	North San Diego
San Joaquin County			
San Joaquin Brick Co., J. F. Stein, Secretary	b	33 S. El Dorado St., Stockton	Stockton
Stockton Brick & Tile Co.	c	McKinley Ave., Stockton	Stockton

San Luis Obispo County			
Antelope Mud Co., W. G. Angus, Mgr.	d	Box 204, Lost Hills	Cholame
San Luis Brick Works, Faulstick Bros.	b	San Luis Obispo	San Luis Obispo
San Mateo County			
Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
Santa Barbara County			
McNall Building Materials	a, b, c	208 N. Salsipuedes, Santa Barbara	Santa Barbara
Parker Brick Co., J. Y. Parker	a, b	303 Ladera St., Santa Barbara	Santa Barbara
Santa Clara County			
Coyote Creek Clay Beds, L. R. Lenfest	c	1195 E. Santa Clara St., San Jose	San Jose
Garden City Pottery	a	560 N. 6th St., San Jose	San Jose
Gladding Bros. Mfg. Co.	a, b, c	S. 3d and Keyes Sts., San Jose	San Jose
Handcraft Tile Co., L. W. Austin et al.	a	R.F.D. 2, Box 121A, San Jose	San Jose
Myers Ceramic Pottery, A. Clay Myer	a	Box 97, Santa Clara	Santa Clara
Remillard Brick Co.	b	569 3d St., Oakland	San Jose
San Jose Brick Co.	b	Box 274, San Jose	San Jose
S. & L. Tile Co.	a	1881 S. 1st St., San Jose	San Jose
Sonoma County			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Glen Ellen
Stanislaus County			
Coopertown Clay Deposit, J. H. Hornsby	c	651 Cumberland St., Pittsburg	Coopertown
Sutter County			
Gladding, McBean & Co.	e	2901 Los Feliz Blvd., Los Angeles	Nicolaus
Tulare County			
San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
Ventura County			
Hercules Rotary Mud Co., Selby Shale Pit	d	2000 N. Ventura Ave., Ventura	Ventura
Shell Oil Co., Dent Clay Pit	d	Shell Bldg., San Francisco	Ventura

* Plant destroyed by fire.
a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Ganister.

COAL

Operator	Remarks	Address	Location of mine
Amador County			
Buena Vista Coal Mine, Fred Harkness & Sons		Ione	Buena Vista
San Benito County			
M & R Coal Mine		R.F.D. 1, Box 81, Salinas	San Benito
Trinity County			
Tom Reese		Douglas City	Douglas City

COPPER

Principal Copper Producers in California during 1938

Mine	Operator	Address	Location of mine
Calaveras County			
Penn	Penn Copper and Zinc Mining Co.	Lodi	Campo Seco
El Dorado County			
Big Canyon	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle
Imperial County			
American Girl	O'Brien Mines, Inc.	Box 465, Ocean Beach	Ogilby
Inyo County			
Cardinal	Cardinal Gold Mining Co.	Bin D, Bishop	Bishop
Nevada County			
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Washington
Plumas County			
Walker	Walker Mining Co.	818 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County			
Black Eagle	Imperial Smelting & Ref. Co.	Box 1096, Indio	Indio
San Bernardino County			
Roosevelt	Bagdad Chase	Daggett	Daggett
Kelly	Frank W. Royer	Red Mountain	Red Mountain

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
Los Angeles County		
The Dicalite Co.	756 S. Broadway, Los Angeles	San Pedro
Diatomaceous Earth Corp.	Walteria	Walteria
Monterey County		
Pacatome, Ltd.	Bradley	Bradley
Santa Barbara County		
Johns-Mansville Products Corp.	Lompoc	Lompoc
Lompoc Mining Products, Inc.[1]	Lompoc	Lompoc

[1] Now out of business.

DOLOMITE

Operator	Address	Location of quarry
Inyo County		
Inyo Marble Co.	726-732 E. 29th St., Los Angeles	Keeler
Los Angeles County		
W. F. Glasser, Inc.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Monterey County		
Pacific Coast Steel Corp., Sterling Ranch Quarry	20th and Illinois Sts., San Francisco	Natividad
San Benito County		
Archie E. Hamilton	Hollister	Hollister

FELDSPAR

Operator	Address	Location of mine
Fresno County		
Industrial Minerals & Chemical Co.	836 Gilman St., Berkeley	Friant
San Diego County		
Standard Sanitary Mfg. Co., P. R. Jones, Mgr.	Campo	Campo

GARNETS

Operator	Address	Location of quarry or mine
Inyo County		
Tungsten Milling Co., Raymond A. Stolle	Box 461, Bishop	Bishop

GEMS

Operator	Variety	Address
C. M. Carter	Topaz	553 27th St., Oakland
W. C. Eyles	Orbicular and breeciated jasper	2025 Foothill Blvd., Oakland
Robert J. Graham	Irrideseent obsidian	Davis Creek
H. F. Heather	Iceland-spar	236 Oak Knoll Ave., Pasadena
Pala Chief Mine, Margaret S. Moore and M. Wear	Tourmaline, kunzite	Box 33, Pala

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
Amador County				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Arroyo Seco	e	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco	Ione
Ballard	h	W. D. Ingram	Plymouth	Plymouth
Belden Amador	a	Belden Amador Mines, Inc.	Pine Grove	Pine Grove
Black Metal	a	L. A. Dunlavy	Jackson	Jackson
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Central Eureka Dump	c	Central Tailings Co.	564 Market St., San Francisco	Sutter Creek
Comanche Dredge	e	Comanche Gold Dredging Co.	311 California St., San Francisco	Camanche
Defender	a	The Wiljobar Corporation	Pine Grove	Pine Grove
Delta Tailings Dump	c	Delta Tailings Co.	564 Market St., San Francisco	Ione
Dry Creek	h	Rim Cam Gold Dredging Co.	Ione	Ione
E. A. Kent Dredge	h	E. A. Kent Dredging Co.	Sonora	Volcano
Fort Ann	a	J. C. Nimmo & Wm. Anderson	Volcano	Volcano
Fremont Gover	a	Fremont Gover Co.	Jackson	Drytown
Holsinger	h	O. D. Gibson Co.	Oroville	Sloughhouse
Humphreys Dredge	h	Humphreys Gold Corporation	910 First National Bank Bldg., Denver, Colorado	Carbondale
Horton	g	H. G. Kreth	Ione	Ione
Indian Creek	h	R. & M. Mining Co.	Plymouth	Plymouth
Italian	a	Black Hills Mining Co., Inc.	Jackson	Jackson
Kennedy	a	Kennedy Mining & Milling Co.	519 California St., San Francisco	Martell
Keystone Mines	a	Keystone Mine Syndicate	Amador City	Amador City
Lancha Plana Dredge No. 3	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Lincoln Gold Dredge	h	Lincoln Gold Dredging Co.	Lincoln	Sloughhouse
Lorentz	h	E. L. Lilly	706 California Bldg., Stockton	Ione
Mineral Point	a	Amadeo Casazza	Jackson	Jackson
River Pine	h	River Pine Mining Co.	618 3d St., San Rafael	Plymouth
Wolin-Hall-Waekman	h	Wolin-Hall-Waekman	Box 747, Elk Grove	Elk Grove
Butte County				
Butte Unit Yuba Cons. Dredge	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Rio Bonito
Butte Gold Dredge	h	Butte Gold Dredging Co.	Sacramento	Oroville
Cinco Mineros	h	Cinco Mineros Co.	P.O. Box 212, Oroville	Oroville
Coleman Property	k	Charles Coleman	Chico	Chico
Consuelo	h	Consuelo Mines	Oroville	Oroville
Forbestown (Midas-Gold Bank)	a	Idaho Maryland Mines Corporation	Russ Bldg., San Francisco	Forbestown
Gold Hill	e	Gold Hill Dredging Co.	311 California St., San Francisco	Oroville

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
Butte County—Continued				
Granella Ranch	h	Penn Dredging Co.	1620 Bird St., Oroville	Oroville
Hintz	k	Chas. H. Hintz & S. S. Smith	Chico	Chico
Humphreys Dredge	k	Humphreys Gold Corporation	910 First National Bank Bldg., Denver, Colorado	Chico
Oroville Dredge	e	Oroville Gold Dredging Co.	2052 Bird St., Oroville	Oroville
Richter & Sons Dredge	h	Wm. Richter	R.F.D. 2, Box 318, Oroville	Oroville
Skillin Property	k	Butte Mining & Development Co.	Chico	Chico
Surcease	a	Hoefling Bros.	400 N. 16th St., Sacramento	Yankee Hill
Thompson's Flat	h	Table Mountain Dredging Co.	Redding	Thompson Flat
Calaveras County				
California Gold Dredge	e	California Gold Dredging Co.	503 Balfour Bldg., San Francisco	Linden
Camanche Placers	e	Camanche Placers, Ltd.	Camanche	Camanche
Carson Hill	a	Carson Hill Gold Mining Corporation	Melones	Melones
Cook Properties	k	Pacific Placers Engineering Co.	1736 Standard Ave., Glendale	Camanche
Easy Bird	a	Le Roi Mines, Inc.	Box 905, Jackson	San Andreas
General Dredge	h	General Dredging Corporation	505 Bank of America Bldg., Sacramento	San Andreas
Gruwell Dredge	h	C. E. Gruwell	Angels Camp	Angels Camp
K. D. Winship Estate	h	K. D. Winship Estate	350 Post St., San Francisco	Wallace
Lancha Plana Dredge No. 2	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Lilly (Crocker)	h	E. L. Lilly	706 California Bldg., Stockton	Wallace
Lloyd	f	E. B. Crouch	San Andreas	San Andreas
Milton	h	Milton Gold Dredging Enterprise	Milton	Milton
Mother Lode Central	a	Mother Lode Central Mines, Inc.	Angels Camp	Angels Camp
Mountain King	a	Jumbo Cons. Mining Co.	506 Bay Cities Bldg., Santa Monica	Copperopolis
Oneto Ranch	k	E. B. Kelly & Chas. C. Roe	San Andreas	San Andreas
Robbins Claims	k	Pacific Placers Engineering Co.	1736 Standard Ave., Glendale	Valley Springs
Royal	a	Frank S. Tower	Milton	Milton
San Andreas Dredge	h	San Andreas Dredging Co.	San Andreas	San Andreas
Sheepranch	a	St. Joseph Lead Co.	Sheepranch	Sheepranch
Thompson Dredge	e	Chas. James Thompson	Linden	Linden
University Dredge	h	Universal Dredging Corporation	San Andreas	San Andreas
Vallecito Western	f	Vallecito Mining Co., Inc. (Don Steffa)	Murphys	Angels Camp
Wallace Dredge	e	Wallace Dredging Co.	311 California St., San Francisco	Camanche
Western Quartz	a	Western Quartz Mining Co.	Sheepranch	Sheepranch
Winkle Property	k	Pacific Placers Engineering Co.	1736 Standard Ave., Glendale	Valley Springs
El Dorado County				
Beebe-Alpine	a	Beebe Gold Mining Co.	1022 Crocker Bldg., San Francisco	Georgetown
Big Canyon	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle
Big Canyon Dredge	h	Big Canyon Dredge	Box 33, Shingle	Shingle
Black Oak	a	Russell J. Wilson	Garden Valley	Garden Valley

Buck's Bar	h	Horseshoe Dredging Co.	Youngs	Youngs
El Dorado Crystal	a	El Dorado Crystal Mine	Shingle	Shingle
Loveless	a	G. L. Fiske & Tom Kloczko	Rescue	Rescue
Kelsey	a	Kelsey Mining Co., Inc.	519 California St., San Francisco	Placerville
Middle End	a	Cosumnes Mines, Inc.	Grizzly Flats	Grizzly Flats
Rosecrans	a	Lode Development Co.	Auburn	Auburn
Sliger	a	Middle Fork Gold Mining Co.	Box M, Auburn	Greenwood
Spanish Oak	a	Russell J. Wilson	Garden Valley	Garden Valley
Stuckslager	d	E. J. McKenney	2704 D St., Sacramento	Lotus
Humboldt County				
Pearch	g	Roy McGain & Garcia E. Snow	Orleans	Orleans
Imperial County				
American Girl	a	O'Brien Mines, Inc.	Box 465, Ocean Beach	Ogilby
Cargo Muchacho Group	a	Holmes & Nicholson	Box 828, Yuma, Arizona	Ogilby
Sovereign	a	Sovereign Development Co.	Ogilby	Ogilby
Tumco Tailings	c	E. L. Riggs	Ogilby	Ogilby
Inyo County				
American Eagle (Little Jean)	a	F. N. Banta	Inyokern	Inyokern
Arondo	a	Argus Mining Co.	650 S. Grand Ave., Rm. 501, Los Angeles	Trona
Cardinal	a	Cardinal Gold Mining Co.	Bin D, Bishop	Bishop Creek
Copper Queen	a	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Golden Treasure	m	Ashford Brothers	Shoshone	Shoshone
Inyo	a	Inyo Cons. Mines, Inc.	Box 74, Death Valley	Death Valley
Morning Star	a	Morning Star Keeler Lease	Keeler	Keeler
Oneida (Mohawk)	a	L. E. Netherton	Red Mountain	Trona
Ruth	a	Burton Bros., Inc.	Rosamond	Trona
Kern County				
Aunt Rosa	a	Frasch & Rudnick	Box 51, Caliente	Caliente
Big Blue	a	Kern Mines, Inc.	605 Market St., San Francisco	Kernville
Big Butte	a	Butte Lode Mining Co.	1231 Roosevelt Bldg., Los Angeles	Mojave
Black Hawk	c	King Solomon Mines Lease	Randsburg	Randsburg
Cactus Queen	a	Cactus Mines Co.	Rosamond	Rosamond
Elephant-Starlight and Lodestar	a	Lodestar Mining Co.	Box 235, Mojave	Mojave
Eureka	a	Morris Albertoli	Mojave	Mojave
Fairview	a	E. W. Little	Box 70, Star Route, Rosamond	Rosamond
Four Jacks	a	Four Jacks Mining Co.	Box 184, Mojave	Mojave
Golden Queen	a	Golden Queen Mining Co.	Box 296, Mojave	Mojave
King Solomon	a, c	J. H. Christensen	Randsburg	Randsburg
Middle Butte	a	Holmes, Gagon & Smith	Mojave	Rosamond
Operator	a	Operator Cons. Mines Co.	Randsburg	Randsburg
Standard	a	A. J. Bruce	Mojave	Mojave
Tropico	a	Burton Bros., Inc.	Rosamond	Rosamond
Yellow Aster	a	Anglo American Mining Corp., Ltd.	Randsburg or 206 Sansome St., San Francisco	Randsburg
Yellow Dog	a	Alphonse Degrave	Mojave	Mojave

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
Los Angeles County				
Governor	a	Governor Mine Co.	725 S. Figueroa St., Los Angeles	Aeton
Valvue	a	Blake & Daly	Fairmont	Fairmont
Mariposa County				
Bandarita	a	Bandarita Mining Co.	Coulterville	Coulterville
Bondurant	a	Bondurant Mining & Milling Co.	Coulterville	Coulterville
Champion	a	Carda Mining Co.	Box 54, Coulterville	Coulterville
Cotton Creek	a	Cotton Creek Mining Co.	707 MacDonald Ave., Richmond	Hornitos
Diltz	a	E. R. Baker, et al.	1518 14th St., Sacramento	Whitlock
Melvina	a	Boston California Mining Co.	Sonora	Coulterville
Marble Springs	a	E. S. McCurdy & P. D. Burtt	220 Montgomery St., San Francisco	Coulterville
Miners' Hope	a	Whitlock Mines Corporation	Mariposa	Mariposa
Miocene No. 2 & Gold Bug	a	N. D. Madden & K. L. Goulter	Coulterville	Coulterville
Mt. Gaines	a	Mt. Gaines Mining Co.	Hornitos	Hornitos
Nutting Dredge	h	Nutting Dredging Co.	Box 728, Salinas	Le Grand
Pine Tree and Josephine	a	Pacific Mining Co.	1022 Crocker Bldg., San Francisco	Bear Valley
Placer Properties	h	Placer Properties Co., Inc.	Le Grand	Le Grand
Schroeder Group	a	Charles M. Schroeder	Midpines	Midpines
Trebor Dredge	a	Trebor Corporation	Mariposa	Mariposa
Merced County				
Merced Dredge No. 1	e	Merced Dredging Co.	1805 Mills Tower, San Francisco	La Grange
Merced Unit	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Snelling
San Joaquin Dredge No. 1	e	San Joaquin Mining Co.	1805 Mills Tower, San Francisco	La Grange
Snelling Dredge No. 1 and No. 2	e	Snelling Gold Dredging Co.	Snelling	Snelling
Mono County				
Log Cabin	a	Mutual Gold Corporation	401 Fernwell Bldg., Spokane, Wash.	Leevining
Standard	a	Roseklip Mines Co.	206 Sansome St., San Francisco	Bodie
Napa County				
Grigsby (Palisades)	b	Graham Loftus Oil Corporation	811 W. 7th St., Los Angeles	Calistoga
Nevada County				
Bullion	a	Grass Valley Bullion Mines, Inc.	Grass Valley	Grass Valley
Davey (Atlas Dredge)	h	Atlas Gold Dredging Corp.	712 Edison Bldg., Los Angeles	Grass Valley
Douglas Property	h	Gold Star Dredging Co.	Box 265, Marysville	Rough and Ready
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., New York City, N. Y.	Grass Valley
Giant King	a	Washington Giant King Gold Mines, Inc.	Nevada City	Nevada City

Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Great Northern	a	Great Northern Gold Mines, Inc.	310 Broad St., Nevada City	Nevada City
Idaho Maryland	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Grass Valley
Innis Dredge	h	Innis Dredging Co.	Nevada City	Nevada City
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Norambagua	a	Campbell Grass Valley Mining Co.	Grass Valley	Grass Valley
Omega	g	South Yuba Mining & Development Co.	7 Front St., San Francisco	Washington
Spanish	a	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Washington
Trude	k	Shovel Placer Mining Co.	Nevada City	North Columbia
Placer County				
Alabama	a	Alabama California Gold Mines Co.	Box 155, Auburn	Penryn
Antelope Creek	c	Antelope Creek Dredging Co.	311 California St., San Francisco	Loomis
Auburn Chicago	a	Auburn Chicago Mining Co.	645 S. Mariposa Ave., Los Angeles	Penryn
Auburn Ravine	k	Pantle Bros.	Lincoln	Lincoln
Barton Ranch and Chabot property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Loomis
Bohnett Dredge	k	F. O. Bohnett	150 S. Montgomery St., San Jose	Lincoln
E. L. Hill Dredge	k	E. L. Hill	North San Juan	Roseville
Fay Placer	h	Fay Placer Mine	Lincoln	Lincoln
Gaylord Lee Valle	f	A. Swinburn	Box 106, Sta. A, Auburn	Auburn
General Utility	h	General Utility Corp.	505 Bank of America Bldg., Sacramento	Roseville
Isom Ranch	k	Nevada City Development Co.	Nevada City	Loomis
Kiss & Clark properties	k	Panob Gold Dredging Co.	Loomis	Loomis
Lincoln Dredge	h	Lincoln Gold Dredging Co.	Lincoln	Lincoln
Newcomb	k	Charles N. Chittenden	Lincoln	Lincoln
Oro Bell Dredge	e	Oro Bell Dredging Co.	2466 Virginia St., Berkeley	Loomis
Oro Fino	a	Oro Fino Cons. Mines	Box 432, Auburn	Auburn
Rawhide Group	a	Canyon Mines Corp.	144 Kearny St., San Francisco	Baxter
Recalp	h	Jasper-Stacy Co.	216 Pine St., San Francisco	Lincoln
Sisley	a	Burm Ball Mining Co.	Box 306, Auburn	Auburn
Thompson	k	T. D. Lindblad	1923 12th Ave., Sacramento	Roseville
----------	a	A. C. Crosby	Lincoln	Lincoln
Plumas County				
Droege & New York	a	North Canyon Mines, Inc.	Greenville	Greenville
Glacier	f	William F. Booth, Jr.	1110 Crocker Bldg., San Francisco	Seneca
Grays Flat	h	Lord & Bishop	Box 812, Sacramento	Rich Bar
Imperial	a	Gerald R. Simpson	Box 957, Quincy	Quincy
Meadow Valley	k	F. O. Bohnett	54 N. Union Ave., Campbell	Meadow Valley
Ohio Point (Virgilia)	a	Virgilia Mining Corp.	Virgilia	Virgilia
Standart	a	Indian Valley Mining Co., Inc.	Greenville	Greenville
Walker	j	Walker Mining Co.	818 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County				
Black Eagle	a	Imperial Smelting & Refining Co.	811 W. 7th St., Los Angeles	Indio
Ida Leona	a	Ida Leona Mng. & Mlng. Co.	Perris	Perris
Red Cloud	a	Frank Ahlburg	1608 N. Vermont Ave., Los Angeles	Chuckawalla

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
Sacramento County				
Capital Dredge	e	Capital Dredging Co.	351 California St., San Francisco	Folsom
Cosumnes Dredge	e	Cosumnes Gold Dredging Co.	351 California St., San Francisco	Sloughhouse
General Dredge	h	General Dredging Corp.	505 Bank of America Bldg., Sacramento	Folsom
Gold Hill Dredge	e	Gold Hill Dredging Co.	311 California St., San Francisco	Folsom
Hoosier Gulch	h	Hoosier Gulch Placers	1317 23d St., Sacramento	Folsom
Lord & Bishop Dredge	h	Lord & Bishop	Box 812, Sacramento	Sacramento
Natomas	e	Natomas Co.	Box 1197, Sacramento	Natoma
San Bernardino County				
Carlyle	a	Carlyle Mining Co.	463 S. Clark Dr., Beverly Hills	Twentynine Palms
Gold Crown	a	Gold Crown Mining Co., Ltd.	714 W. Olympic Blvd., Los Angeles	Twentynine Palms
Kelly	b	Frank W. Royer	Red Mountain	Red Mountain
Lucky	a	E. C. Johnson	Baker	Baker
Roosevelt	a	Bagdad Chase	Daggett	Daggett
Vulcan	a	Funk Bros.	Amboy	Amboy
San Joaquin County				
K. D. Winship Estate	h	K. D. Winship Estate	350 Post St., San Francisco	Camanche
Wallace Dredge	e	Wallace Dredging Co.	311 California St., San Francisco	Camanche
Watkins Dredge	h	A. G. Watkins & Sons	Linden	Linden
San Luis Obispo County				
Oro Fino	k	F. H. Gates, Inc.	Box 247, Santa Maria	Nacimiento
Shasta County				
Blue Gravel	a	Larsen Bros.	5220 21st St., Sacramento	Redding
Carlson & Sandburg Dredge	h	Carlson & Sandburg	Lorenz Hotel, Redding	Redding
Cinco Mineros	h	Cinco Mineros Co.	Box 212, Oroville	Redding
Dry Creek	h	Pioneer Dredging Co.	Box 700, Redding	Redding
El Oro Dredge	h	El Oro Dredging Co.	Box 77, Cottonwood	Cottonwood
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
Olson Dredge	h	Roy S. Olson	1178 Walnut Ave., Redding	Redding
Pilot Dredge	h	Pilot Dredging Co.	Box 579, Redding	Redding
Piombo Dredge	h	Piombo Dredging Co.	1571 Turk St., San Francisco	Redding
Red Hill	k	Harold Hellwig	150 S. Montgomery St., San Jose	Redding
Roaring River	e	Roaring River Gold Dredging Co.	351 California St., San Francisco	Cottonwood
Thibaut Ranch	h	Gold Acres Dredging Co.	Cottonwood or 658 Haddon Rd., Oakland	Cottonwood
Walker	a	Stewart-Brown Co.	206 Sansome St., San Francisco	Redding
Washington	a	J. H. Scott Co.	Merchants Exchange Bldg., San Francisco	French Gulch
----------	a	A. P. Robillard	French Gulch	French Gulch
----------	a	Roy Rohlin	Shasta	Shasta

Sierra County				
Bowden Group	h	Kanaka Corp.	Box 1009, Wallace, Idaho	Alleghany
Depot Hill	g	F. J. Joubert	Camptonville	Camptonville
Golden Bear	f	Golden Bear Mines, Ltd.	47 2d St., San Francisco	Downieville
Gold Point	a	Tombstone Development Co.	Tombstone, Arizona	Downieville
Kenton	a	Gamble & Wilson	Alleghany	Alleghany
Plumbago	a	O'Brien Mines, Inc.	Box 465, Ocean Beach	Alleghany
Ruby	f	C. L. Best	Goodyears Bar	Goodyears Bar
Sixteen to One	a	Original Sixteen to One Mines, Inc.	1611 Russ Bldg., San Francisco	Alleghany
----------	a	A. J. Oyster	Sierra City	Sierra City
Siskiyou County				
Cal Oro Dredge	e	Cal Oro Dredging Co.	681 Market St., San Francisco	Yreka
Escobar	a	A. L. Renshaw	Sawyers Bar	Sawyers Bar
Gold Ball	a	Gold Ball Mining Co.	Sawyers Bar	Sawyers Bar
Happy Camp	k	St. Lawrence Mining Co.	Happy Camp	Happy Camp
Joseph Fillipe	k	Floyd O. Bohnett	150 S. Montgomery St., San Jose	Yreka
Joubert	g	George Tulare	Gold Hill, Oregon	Sawyers Bar
King Solomon	a	King Solomon Mines Co.	Monte Vista, Colorado	Black Bear
McConnell Bar	k	Wm. Von der Hellen Mines	Box 158, Yreka	Yreka
Scandia	h	Larsen & Harms	5220 21st St., Sacramento	Horse Creek
Siskiyou Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Callahan
S T S	g	J. F. Judge	Sawyers Bar	Sawyers Bar
Yreka Dredge	e	Yreka Gold Dredging Co.	351 California St., San Francisco	Yreka
Stanislaus County				
Carlson & Sandburg Dredge	h	Carlson & Sandburg	Lorenz Hotel, Redding	Knights Ferry
Dredge No. 4	e	La Grange Gold Dredging Co.	Mills Bldg., San Francisco	La Grange
Tuolumne Dredge	e	Tuolumne Gold Dredging Corp.	La Grande	La Grange
Tehama County				
Bend (Midland Dredge)	h	Midland Co.	733 Dwight Bldg., Berkeley	Red Bluff
Trinity County				
Bergin	g	Frank W. Kay & J. W. Bergin	Junction City	Junction City
Brown Bear	a	Brown Bear Mining Co.	French Gulch	Lewiston
Canyon Placers	g	G. H. Bergin	Junction City	Junction City
Carlson & Sandburg Dredge	h	Carlson & Sandburg	Lorenz Hotel, Redding	Lewiston
Clarence Young Dredge	k	Clarence Young	Del Loma	Del Loma
Enterprise	a	Al Hansen & Co.	Box 66, Weaverville	Weaverville
General Utility	h	General Utility Corp.	505 Bank of America Bldg., Sacramento	Weaverville
Hayfork Dredge	h	Hayfork Gold Dredging Co.	Hayfork	Hayfork
Junction City	e	Junction City Mining Co.	685 6th St., San Francisco	Junction City
Leas & Lowden Property	h	Interstate Mines, Inc.	912 Balfour Bldg., San Francisco	Lewiston
Lewiston Gold Dredge	e	Lewiston Gold Dredging Co.	420 Market St., San Francisco	Lewiston
Oro Trinity	h	Oro Trinity Dredging Co.	Box 212, Oroville	Weaverville
Pattison	k	G. F. Cloud	639 1st St., Woodland	Big Bar
Pioneer Dredge	h	Pioneer Dredging Co.	Box 151, Weaverville	Weaverville
Red Hill	g	Goldfield Cons. Mines Co.	1225 Crocker First Nat'l Bank Bldg., San Francisco	Junction City

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
Trinity County—Continued				
Sourdough	h	Golden Gravel Mining Co.	525 Merchants Exchange Bldg., San Francisco	Junction City
Trinity Dredge	e	Trinity Dredging Co.	Lewiston	Lewiston
Viking Dredge	h	Viking Dredging Co.	Box 568, Redding	Redding
Weaver Dredge	h	Weaver Dredging Co.	Box 216, Weaverville	Weaverville
West Weaver Creek	h	Pacific Gold Dredging Co.	2929 X St., Sacramento	Weaverville
Tuolumne County				
Boston-California	a	Boston California Mining Co.	Sonora	Sonora
Columbus	a	Columbus Gold Mining Co.	1 Montgomery St., San Francisco	Tuolumne
Densmore	a	Densmore Gold Mines, Inc.	Box 126, Columbia	Columbia
Eagle Shawmut	a	Miller & Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Enterprise	a	Enterprise Cooperative Syndicate	Box 264, Sonora	Sonora
Heslep	a	Gold Diggers Syndicate	Jamestown	Jamestown
Kent Dredge	h	E. A. Kent	149 California St., San Francisco	Sonora
Moccasin	h	Moccasin Mines	5220 21st Ave., Sacramento	Columbia
Rim Cam	h	Rim Cam Gold Dredging Co.	Jamestown	Jamestown
Sugarman	a	Ralph Butler, Sr.	5 Rose Ct., Sonora	Sonora
Sullivan	k	Jack Sullivan	Sonora	Sonora
Yuba County				
Blue Point	f	Asa Fippin	Smartville	Smartville
Camp Far West	k	Camp Far West Mining Co.	Wheatland	Wheatland
Horseshoe	a	Orrin P. Peterson	Challenge	Challenge
Mammoth	e	Williams Bar Gold Dredging Co.	918 Hobart Bldg., San Francisco	Smartville
Pennsylvania	a	Empire Star Mines Co., Ltd.	14 Wall St., New York City	Browns Valley
Yuba Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-Gold mine. k. Power shovel. m. Lead mine.

Operator	Product	Address	Location of quarry
Fresno County			
Academy Granite	a	Clovis	Clovis
Superior-Academy Granite Co.	a	Clovis	Academy
Lassen County			
A. D. Greig, Greig Quarry	a	Susanville	Susanville
Los Angeles County			
Binder Bros., W. H. Binder	d	285 N. Lake Ave., Pasadena	Bouquet Canyon
Madera County			
Madera Quarries Co.	a	Box 156, Madera	Bates Station
Mariposa County			
Yosemite National Park	a	Yosemite	Yosemite Park
Nevada County			
Netz Granite Quarry, Ludwig Netz	a	Nevada City	Nevada City
Placer County			
Union Granite Co., Ruhkala Bros.	a	Rocklin	Rocklin
Victor Wickman	a	Rocklin	Rocklin
Plumas County			
Paul Sonognini	a	Chilcoot	Chilcoot
Riverside County			
Emil Johnson	a, e	Perris	Perris
Sacramento County			
Folsom State Prison	a, e	Represa	Represa
San Bernardino County			
Texas Quarries, Inc., R. M. Richter	a	Box 91, Austin, Texas	Victorville
San Diego County			
Crystal Black Quarry, John Stridsburg	a	Escondido	Spooks Canyon
Pacific Cut Stone & Granite Co.	a	414 S. Marengo Ave., Alhambra	Escondido
Shasta County			
Lassen Volcanic National Park	a	Mineral via Red Bluff	Lassen Volcanic National Park
Sonoma County			
S. Cabrol	b, c	Glen Ellen	Glen Ellen
Ernest Laurent	b, c	Kenwood	Kenwood
Ventura County			
Ritchie Bros., R. A. Ritchie and J. A. Ritchie	a	Fillmore	Grimes Canyon

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone and building stone. d. Mica schist used as building stone. e. Paving blocks.

GYPSUM

Operator	Address	Location of quarry
Alameda County		
Westvaco Chlorine Prod. Corp.*	Newark	Newark
Fresno County		
Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe	Dos Palos	Dos Palos
Green & Collins	Ceres	South Dos Palos
Paoli Gypsum Mine, A. P. Shepard, Mgr.	3101 Mariposa St., Fresno	Mendota
Imperial County		
Imperial Gypsum Quarry, Pacific Portland Cement	111 Sutter St., San Francisco	Plaster City
Riverside County		
U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland

*Output not included in production figures as gypsum is byproduct of chemical process using minerals already included in State total.

IODINE

Operator	Address	Mine
Los Angeles County		
Deepwater Chemical Co., Ltd.	Box 588, Compton	Compton
I. O. Dow Chemical Co.	310 Santiago Ave., Long Beach	Long Beach

IRON

Operator	Address	Location of mine
Inyo County		
L. S. McGirk	Shoshone	Shoshone
San Bernardino County		
Cave Canyon Iron Mine, A. S. Vinnell Co.	11 Westminster Ave., Alhambra	Baxter
Santa Cruz County		
Coast Metals & Reduction Co.	Rob-Roy, c/o Watsonville	Aptos

Principal Lead Producers in California during 1938

Mine	Operator	Address	Location of mine
Inyo County			
Copper Queen	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Defiance	Darwin Lead Co.	Darwin	Darwin
Golden Treasure	Ashford Bros.	Shoshone	Shoshone
MacLean	Dr. John MacLean	5961 S. Main St., Los Angeles	Big Pine
Phil Day	H. P. Gower	Death Valley	Death Valley
Peg One Leg	H. L. Eckloff	Box 66, Keeler	Keeler
Santa Rosa	Santa Rosa Mines Dev. Co.	Keeler	Keeler
Ubehe	Grant Snyder	Continental Bldg., Los Angeles	Death Valley
	Theo. Peterson	Darwin	Darwin
Nevada County			
Empire Star Group	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	922 Croeker Bldg., San Francisco	Washington
Placer County			
Alabama	Alabama California Gold Mines Co.	Box 1155, Auburn	Penryn
Riverside County			
Black Eagle	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
San Bernardino County			
Forty Nine	Alexander & Robinson	Goldsprings, Nevada	Goldsprings, Nevada

LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
Alameda County			
Westvaco Chlorine Prod. Corp.	a, d	Newark	Newark
El Dorado County			
Auburn Chemical Lime Co., Ltd.	a, b	Auburn	Neweastle
Diamond Springs Lime Co.	a, b, c	Diamond Springs	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Pres.	b	Shingle Springs	Shingle Springs
Pac. Portland Cement Co., Cons.	b	111 Sutter St., San Francisco	Auburn
Fresno County			
Mt. Campbell Lime Co., R. C. Finck, Mgr.	c, e	Dinuba	Reedley
Inyo County			
Blue Star Tale Mine, Ltd.	b	840 S. San Julian St. Los Angeles	Zurich
Los Angeles County			
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	
Riverside County			
Howard Small	b	311 Main St., Riverside	Riverside
San Bernardino County			
Cal. Portland Cement Co.	a	601 W. 5th St., Los Angeles	Colton
Chubbuck Lime Co., Chas. I. Chubbuck	a, b, c	500 Worth St., Los Angeles	Chubbuck
Victorville Lime Rock Co.	b	2424 Enterprise St., Los Angeles	Victorville
San Luis Obispo County			
Charles Taylor	b	Salinas	Cambria
San Mateo County			
Pacific Portland Cement Co.	c, d	111 Sutter St., San Francisco	San Mateo
Santa Clara County			
Basic Limestone Products Co., R. J. Schirm	b	1 Division St., San Francisco	Los Gatos
Bay Shell Co.	c, d	503 Market St., San Francisco	Alviso
L. H. Beck	c, d	Box 113, Colma	Alviso
California Lime Marl Fertilizer Co.	c, e	R.F.D. 1, Box 684, San Jose	Edenvale
W. B. Ortley Shell Co.	d	Alviso	Alviso

Santa Cruz County			
Henry Cowell Lime and Cement Co., W. H. George, Mgr.	a, b	2 Market St., San Francisco	Santa Cruz
Pacific Limestone Prod. Co.	b	Spring St., Santa Cruz	Santa Cruz
Tuolumne County			
McLean Quarry, W. S. McLeans	a	419 Bayshore Blvd., San Francisco	Columbia
U. S. Lime Products Corp.	a, b	58 Sutter St., San Francisco	Sonora

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

MAGNESITE

Operator	Address	Location of mine
Santa Clara County		
Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine	Newark	Red Mountain
Stanislaus County		
Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine	Newark	Gustine

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
Alameda County			
Westvaco Chlorine Prod. Corp.	Hydroxide	Newark	Newark
San Diego County			
Westvaco Chlorine Prod. Corp.	Chloride	Newark	San Diego
San Mateo County			
Marine Chemical Co., R. E. Clarke	Carbonate hydroxide and oxide	South San Francisco	South San Francisco
Plant Rubber & Asbestos Works	Carbonate	537 Brannan St., San Francisco	Redwood City

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
Los Angeles County			
W. F. Glasser, Inc.	b	713 N. Sepulveda, Los Angeles	Brentwood Heights
San Bernardino County			
Onyx Mine, John Olsen & Pete Logan	c	Whitewater	
San Luis Obispo County			
Reynolds Quarry, Thomas C. Reynolds	b	Box 53, Paso Robles	Paso Robles
Santa Barbara County			
G. Antolini	b	111 E. Gutierrez St., Santa Barbara	Tijguas

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

MICA

Operator	Variety	Address	Location of property
Imperial County			
Mica Talc Co., Inc.	Mica schist	2908 S. Pacific Blvd., San Pedro	Ogilby

Operator	Address	Location of spring
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Calaveras County		
Mok-Hill Mineral Springs, Cavanaugh & Pierovich	Jackson	Mokelumne Hill
Colusa County		
Cooks Springs, D. D. Markham	Lodoga	Cooks Springs
Contra Costa County		
Alhambra Water Co.	Martinez	Martinez
El Dorado County		
Digger Indian Natural Medicine Water Co.	Randall P.O.	Randall
Fresno County		
Mercey Mineral Springs Co., F. J. Bourn, Pres.	Dos Palos	----------
Lake County		
Adams Mineral Springs, Clarence Prather	Adams, via Middletown	Adams
The Majestic Bottling Co.	20 Beideman St., San Francisco	Bartlett Springs
Norman Mineral Springs, H. C. Norman, Mgr.	Middletown	Middletown
Witter Medical Springs, W. E. Whitaker	995 Market St., San Francisco	Witter Springs
Los Angeles County		
Cascade Water Co.	4556 York Blvd., Los Angeles	Los Angeles
Deep Rock Artesian Water	4416 York Blvd., Los Angeles	Los Angeles
Elysian Spring Water Co.	1536 Baxter, Los Angeles	Los Angeles
Frespuro Artesian Water	4430 York Blvd., Los Angeles	Los Angeles
Holly Spring Water	2298 Holly Dr., Los Angeles	Los Angeles
Magnetic Spring Water Co.	936 Palm Ave., Sherman	Los Angeles
Mission Spring Water Co.	8938 Keith, Hollywood	Hollywood
Mountain Spring Water Co.	226 S. Avenue 54, Los Angeles	Los Angeles
Pure-lax Mineral Water Co.	3640 Griffin, Los Angeles	Los Angeles
Sparklett Bottled Water Co.	4500 York Blvd., Los Angeles	Los Angeles
Marin County		
Purity Spring Water Co.	2032 Kearny St., San Francisco	----------
Modoc County		
Surprise Valley Mineral Wells, Simon Bennett	Cedarville	Cedarville

MINERAL WATER—Continued

Operator	Address	Location of spring
Napa County		
Calistoga Bottling Works, E. E. Hardies	Calistoga	Calistoga
Napa Soda Springs Co., G. H. T. Jackson	315 Montgomery St., San Francisco	Napa
Napa Vichy Springs, V. Frugoli	225 Bay St., San Francisco	Napa
Samuels Soda Springs, Mrs. Robert J. Little	Monticello	Monticello
Placer County		
Kilaga Water Co.	Lincoln	Valley
Riverside County		
Beulah Springs, Oscar C. McNicholl	Arlington	Arlington
San Bernardino County		
Arrowhead Hot Springs, Calif. Cons. Water Co.	1566 E. Washington Blvd., Los Angeles	Arrowhead
San Diego County		
Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co.	67 8th St., San Diego	San Diego
Rock Springs Co., E. S. Walck	R.F.D. 2, Box 442, Escondido	Escondido
San Francisco County		
Blue Crest Beverage Co., Morris & Paul Greenberg	265 Naples St., San Francisco	San Francisco
Diamond Rock Spring Water Co., L. Paolinelli	247 Naples St., San Francisco	San Francisco
San Luis Obispo		
Crystal Spring Water Co., W. R. Hudson	R.F.D. 2, Box 11, San Luis Obispo	San Luis Obispo
Santa Barbara County		
Veronica Mineral Springs Co.	699 Brannan St., San Francisco	Santa Barbara
Siskiyou County		
Coca Cola Bottling Co., Fred J. Meamber, Prop.	Yreka	Little Shasta
The Shasta Water Co.	6th and Brannan Sts., San Francisco	Dunsmuir
Sonoma County		
Agua Caliente Springs Co., T. H. Corcoran, Prop.	Agua Caliente	Agua Caliente
Barcal Springs, John Kolling	Preston	Preston
Boyes Springs Mineral Water Co.	Boyes Springs	Boyes Springs
Fetters Mineral Springs, George Fetters	Fetters Springs	Fetters Springs

PLATINUM

Principal Platinum Producers in California in 1938

Operator	Address	Location of mine
Butte County		
Yuba Cons. Goldfields Co.*	351 California St., San Francisco	Rio Bonito
Merced County		
Mereed Dredging Co.	Mills Bldg., San Francisco	Snelling
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Snelling
Placer County		
Gold Hill Dredging Co.	311 California St., San Francisco	Loomis
Saeramento County		
Capital Dredging Co.*	Balfour Bldg., San Francisco	Folsom
Natomas Co.*	Forum Bldg., Sacramento	Natomas
Shasta County		
Roaring River Gold Dredging Co.	351 California St., San Francisco	Cottonwood
Tehama County		
The Midland Co.	733 Dwight Way, Berkeley	Red Bluff
Trinity County		
Hayfork Dredging Co.	Hayfork	Hayfork
Junction City Mining Co.	Junction City	Junction City
Yuba County		
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Hammonton

*Platinum metals not sold in 1938.

POTASH

Operator	Address	Location of plant
San Bernardino County		
American Potash and Chemical Co.	Trona	Trona

PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of quarry
Amador County			
Industrial Minerals & Chemical Co.	b	836 Gilman St., Berkeley	Edwin
Inyo County			
Chas. Brown	a	Shoshone	Shoshone
Little Lake Pumice Co.	a	1204 S. Monterey St., Alhambra	Coso Junction
Red Mountain Cinder Quarry, H. P. Thelan	b	Little Lake	Little Lake
Paul H. Splane	a	13539 Hart Ave., Van Nuys	Brown
Tonopah & Tidewater Ry.	b	510 W. 6th St., Los Angeles	Shoshone
Kern County			
Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
Madera County			
Elmer Erickson	a	Friant	Friant
Mono County			
Alexander Jamieson	a	Box 20, Big Pine	Big Pine
Pumice Product Co.	a	260 California St., San Francisco	Benton
Napa County			
Basalt Rock Co.	a	8th St., Napa	Monticello
C. Cicero	a	4261 23d St., San Francisco	Monticello
San Luis Obispo County			
Red Eagle Mine, M. L. Francis	b	Creston	Creston
Siskiyou County			
H. W. Free	c	156 Spring St., Klamath Falls, Oregon	Glass Mt.
Klamath Concrete Pipe Co.	a	Klamath Falls, Ore.	Glass Mt.
Volcanic Products Co.	a	Harris Trust Bldg., Chicago, Ill.	Glass Mt.
Dan A. Williams	a	217 Monterey St., Salinas	Mt. Hoffman

a. Pumice. b. Volcanic ash. c. Scoria.

PYRITE

Operator	Address	Location of mine
Shasta County		
Mountain Copper Co., Wm. F. Kett, Mgr.	351 California St., San Francisco	Matheson

Principal Quicksilver Producers in California for 1938, out of a Total of 65 Operating Properties

Mine	Operator	Address	Location of mine
Contra Costa County			
Mt. Diablo	Bradley Mining Co.	Crocker Bldg., San Francisco	Clayton
Fresno County			
Archer	Joseph Byles & Sons	Coalinga	Coalinga
Inyo County			
Coso Hot Spring	A. W. Leege	2233 Anacapa St., Santa Barbara	Little Lake
Kern County			
Cuddeback	Walabu Mining Co.	Box 1168, Bakersfield	Keene
Kings County			
Kings	Bert Harvey	Parkfield	Parkfield
Lake County			
Great Western	Bradley Mining Co.	Crocker Bldg., San Francisco	Middletown
Mirabel	Mirabel Quicksilver Co.	Middletown	Middletown
Sulphur Bank	Bradley Mining Co.	Crocker Bldg., San Francisco	Lower Lake
Monterey County			
Patriquin	Franciscan Mining Co.	Box 724, Monterey	Parkfield
Napa County			
Aetna	J. F. Knapp	1401 Park Ave., Oakland	
Manhattan Mine	Chas. Wilson & W. M. Hickox	Monticello	Monticello
Oat Hill	J. Wenzel	Middletown	Oat Hill
Oat Hill Extension	Zack Anderson	Middletown	At Hill
San Benito County			
Aurora	San Benito Mining Co.	Box 728, Salinas	Idria
New Idria	New Idria Quicksilver Mining Co.	Mills Bldg., San Francisco	Idria
Stayton Quicksilver Mine	R. B. Knox	Hollister	Hollister
San Luis Obispo			
Deer Trail	J. H. Anderson & E. C. Ashurst	Box 951, Santa Maria	
Klau	Klau Mine, Inc.	Mills Bldg., San Francisco	Adelaide
Oceanic	Anglo American Mining Corp.	Mills Bldg., San Francisco	Cambria

QUICKSILVER—Continued

Principal Quicksilver Producers in California for 1938, out of a Total of 65 Operating Properties

Mine	Operator	Address	Location of mine
Santa Barbara County			
Los Prietos	T. H. Canfield	Box 277, Santa Barbara	Santa Barbara
Red Rock	Santa Ynez Mercury Co., Hans Peters, Pres.	Solvang	Solvang
Santa Clara County			
Guadalupe Mine	Laco Mining Co., H. N. Mason	R.F.D. 3, Box 412, Los Gatos	Los Gatos
New Almaden	Quicksilver Mining Co., P. R. Schneider	Los Gatos	Almaden
Sonoma County			
Cloverdale	Mr. George H. Burr (lessee)	Cloverdale	Cloverdale
Contact	Contact Mercury Mines Co.	Pine Flat	Pine Flat
Culver Bear	C. A. Baumester	Cloverdale	Cloverdale
Esperanza	James G. Cortelyou (owner)	Cloverdale	Cloverdale
Yolo County			
Harrison Mine	J. W. Abercrombie & I. S. Hardester	Middletown	Rumsey

Operator	Address	Location of plant
Alameda County		
Leslie Salt Co.	310 Sansome St., San Francisco	Newark and Mt. Eden
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Imperial County		
Imperial Salt Co.	4000 E. Washington Blvd., Los Angeles	Calipatria
Kern County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Saltdale
Los Angeles County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Long Beach
Modoc County		
Surprise Valley Salt Works, Joshua H. Hutchinson	Box 26, Cedarville	Lake City
Monterey County		
Monterey Bay Salt Co., E. C. Vierra, Mgr.	Moss Landing	Moss Landing
Orange County		
The Irvine Co.	Tustin	Tustin
San Bernardino County		
California Rock-Salt Co.	2465 Hunter St., Los Angeles	Amboy
Rock Salt Products Co.	845 El Centro St., South Pasadena	Salt Marsh
San Diego County		
Western Salt Co.	1245 National Ave., San Diego	San Diego
San Mateo County		
Stauffer Chemical Co.	636 California St., San Francisco	Redwood City

SANDSTONE

Operator	Address	Location of quarry
Los Angeles County		
R. L. Glover	917 W. 6th St., Los Angeles	Chatsworth
Monterey County		
Carmel Stone Quarry, A. L. Possadori	Carmel	Carmel
Sierra Quarry, H. E. Rogers	Box 136, Carmel	Carmel
Napa County		
H. F. Galbreath	1668 Lincoln St., Berkeley	
San Luis Obispo County		
Mora Bros.	Box 121, Cambria	Cambria
Shasta County		
H. F. Galbreath	1668 Lincoln St., Berkeley	Ono

SERPENTINE

Operator	Address	Location of mine
San Bernardino County		
Kennedy Clay Pit, John Kennedy	5009 O'Sullivan Dr., Los Angeles	Daggett

SILICA

Operator	Product	Address	Location of mine
Contra Costa County			
Hazel-Atlas Glass Co. of California, Ltd.	b	89th and G St., Oakland	Summerville
Silica Co. of California, Ltd.	b	Brentwood	Brentwood
Monterey County			
Del Monte Properties—Att. C. S. Olmsted	b	Del Monte	Del Monte
Orange County			
Arnold Clay Mine, I. P. Arnold		1846 W. 83d St., Los Angeles	El Toro
Riverside County			
P. J. Weisel, Inc.	b	La Habra	Corona
San Bernardino County			
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Hicks

a. Quartz. b. Glass sand. c. Quartzite.

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
Imperial County			
Vitrefrax Co.	Cyanite	500 Pacific St., Vernon, Los Angeles	Ogilby
Mono County			
Champion Spark Plug Co., Ceramic Division	Andalusite	Butler Ave. and Grand Trunk R.R., Detroit, Mich.	Mocalno

SILVER

Principal Silver Producers in California in 1938

Mine	Type of mine	Operator	Address	Post office of mine
Amador County				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Kennedy	a	Kennedy Mining & Milling Co.	519 California St., San Francisco	Martell
Butte County				
Forbestown (Midas, Gold Bank)	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Forbestown
Surcease	a	Hoefling Bros.	400 N. 16th St., Sacramento	Yankee Hill
Calaveras County				
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Mountain King	a	Jumbo Cons. Mining Co.	506 Bay Cities Bldg., Santa Monica	Copperopolis
El Dorado County				
Big Canyon	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle
Imperial County				
American Girl	a	O'Brien Mines, Inc.	Box 465, Ocean Beach	Ogilby
Inyo County				
Black Eagle	b	National Consolidated Mines Co.	1125 Central Bldg., Los Angeles	Lone Pine
Cardinal	a	Cardinal Gold Mining Co.	Bin D, Bishop	Bishop Creek
Copper Queen	a	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Defiance	c	Darwin Lead Co.	Darwin	Darwin
Golden Treasure	c	Ashford Bros.	Shoshone	Shoshone
Morning Star	a	Morning Star Keeler Mng. Co.	Keeler	Keeler
Reward (Brown Monster)	a	T. L. Bright	Indepencence	Independence
Kern County				
Big Blue	a	Kern Mines, Inc.	605 Market St., San Francisco	Kernville
Cactus Queen	c	Cactus Mines Co.	Rosamond	Rosamond
Elephant, Starlight and Lodestar	a	Lodestar Mining Co.	Box 235, Mojave	Mojave
Eureka	a	Morris Albertoli	Box 2028, Mojave	Mojave
Fairview	a	E. W. Little	Box 70, Star Route, Rosamond	Rosamond
Four Jacks	a	Four Jacks Mining Co.	Box 184, Mojave	Mojave
Golden Queen	a	Golden Queen Mining Co.	Box 296, Mojave	Mojave
Gypsy	a	Dick Moore & Ralph Haney	Mojave	Mojave
Karma	a	E. L. Wegman	Mojave	Mojave
Standard	a	A. J. Bruce	Mojave	Mojave
Tropico	a	Burton Bros., Inc.	Rosamond	Rosamond
Whitmore	a	Whitmore Mines, Inc.	112 W. 9th St., Los Angeles	Rosamond
Yellow Aster	a	Anglo American Mining Corp.	Randsburg or 206 Sansome St., San Francisco	Randsburg

Mariposa County				
Mt. Gains	a	Mt. Gains Mining Co.	Hornitos	Hornitos
Mono County				
Standard	a	Roseklip Mining Co.	206 Sansome St., San Francisco	Bodie
Silverado & Kentuck	b	Sierra Cons. Mines, Inc.	Wellington, Nevada	Sweetwater, Nevada
Green Monster	c	Molini Bros.	Dyer	Dyer
Napa County				
Grigsby (Palisades)	d	Graham Loftus Oil Corp.	811 W. 7th St., Los Angeles	Calistoga
Nevada County				
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Idaho Maryland	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	a	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Washington
Placer County				
Alabama	a	Alabama California Gold Mines Co.	Box 155, Auburn	Penryn
Auburn Chicago	a	Auburn Chicago Mining Co.	645 S. Mariposa Ave., Los Angeles	Penryn
Oro Fino	a	Oro Fino Cons. Mines	Box 432, Auburn	Auburn
Sisley	a	Burm-Ball Mining Co.	Box 306, Auburn	Auburn
Plumas County				
Walker	j	Walker Mining Co.	818 Kearns Bldg., Salt Lake City, Utah	Walkermine
----------	b	H. P. Peterson	Greenville	Greenville
Riverside County				
Black Eagle	a	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
Sacramento County				
Natomas	e	Natomas Co.	Box 1197, Sacramento	Natoma
San Bernardino County				
Calico Tailings	h	Louis Warnken, et al.	Yermo	Yermo
Carlyle	a	Carlyle Mining Co.	463 S. Clark Dr., Beverly Hills	Twentynine Palms
Gold Crown	a	Gold Crown Mining Co., Ltd.	714 W. Olympic Blvd., Los Angeles	Twentynine Palms
Kelly	d	Frank W. Royer	Red Mountain	Red Mountain
Stonewall	b	M. A. Kiwisar	Jean, Nevada	Clark Mountain, Nevada
Zenda	h	Lawrence Coke	Box 47, Yermo	Yermo
Shasta County				
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
Sierra County				
Sixteen to One	a	Original Sixteen to One Mines, Inc.	1611 Russ Bldg., San Francisco	Alleghany
Yuba County				
Yuba Unit	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Hammonton

a. Gold mine. b. Silver mine. c. Lead-Silver mine. d. Gold-Silver mine. e. Gold dredge. h. Tailings dump. j. Copper mine.

SLATE

Operator	Product	Address	Location of quarry
El Dorado County			
Pacific Minerals Co., Ltd.	b	337 10th St., Richmond	Chili Bar
Inyo County			
Mt. Whitney Slate Quarries, R. B. McIlroy	b, c	Star R.F.D. No. 291, Lone Pine	Lone Pine
Los Angeles County			
Blue Goose Quarry, Robert Cox	c	1975 Lundy Ave., Pasadena	Pasadena
Tuolumne County			
Whitney Slate Quarry, W. S. McLean Estate	b	419 Bayshore Blvd., San Francisco	Hetch Hetchy

a. Roofing. b. Granules. c. Flagging.

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
Butte County			
McLean Talc Deposit, W. S. McLean Fst.	a	419 Bayshore Blvd., San Francisco	McLean Spur
El Dorado County			
Jim Bernett	a	Shingle	
Industrial Minerals & Chemical Co.	a	836 Gilman St., Berkeley	Latrobe
Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a	337 10th St., Richmond	Shrub
Inyo County			
Blue Star Talc Mine, Ltd.	b	840 S. San Julian St., Los Angeles	Zurich
Death Valley Talc Co., Att. W. L. Jacobs, Secty.	b	1922 N. Kenmore, Los Angeles	Furnace Creek
Sierra Talc Co., Franklin Booth, Mgr.	b	428 Union League Bldg., Los Angeles	Keeler
Western Talc Co.	b	1901 E. Slauson Ave., Los Angeles	Death Valley
Los Angeles County			
Binder Bros., W. H. Binder	a	285 N. Lake Ave., Pasadena	Bouquet Canyon
San Bernardino County			
Pacific Coast Talc Co.	b	2149 Bay St., Los Angeles	Silver Lake
Southern Calif. Minerals Co., W. S. Skeoch	b	320 Mission Rd., Los Angeles	Kingston Mt.

a. Soapstone. b. Talc.

SODA

Operator	Product	Address	Location of plant
Inyo County			
Natural Soda Products Co.	a, b, d	405 Montgomery St., San Francisco	Keeler
Pacific Alkali Co.	a	1206 Pacific Mutual Bldg., Los Angeles	Bartlett
San Bernardino County			
American Potash & Chemical Co.	a, c	Trona	Trona
West End Chemical Co.	a	Latham Square Bldg., Oakland	West End

a. Soda Ash. b. Sodium Bicarbonate. c. Salt Cake. d. Trona.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
Alameda County			
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco	Livermore
Hanifen Trucking Co.	a	Pleasanton	Pleasanton
Heafey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Henry L. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radum
Kemper Bros.	g	5998 Strabridge Ave., Hayward	Hayward
Langdon Molding Sand, J. H. Langdon	c	R.F.D., Box 89, Niles	Decoto
Red Shale Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	Arroyo Mocho
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a	Box 943, Livermore	Livermore
Thos. B. Russell Quarry, T. B. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Southern Pacific R.R. Co., Asst. Chief Engineer	a, b	Southern Pacific Bldg., San Francisco	Eliot, Niles, Radum
Superior Rock Co.	b	Broadway and McAdams St., Oakland	Oakland
Butte County			
Bechtel-Kaiser Rock Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
J. E. Johnson Rock Co.	b	Weber Ave. and E St., Stockton	Chico
McKean's Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
Western Pacific R.R. Co., E. W. Mason, Gen. Sup't	a	Mills Bldg., San Francisco	----------
Calaveras County			
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond	Angels
Contra Costa County			
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros. Co., Anson Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Hutchinson Co., Stege Quarry	b	329 17th St., Oakland	Stege
Henry J. Kayser Co.	a	1522 Latham Square Bldg., Oakland	Newlove
Ed Roberts	c	Pittsburg	Pittsburg
Silica Co. of Calif., Ltd.	c	Brentwood	Brentwood
Southern Pacific R.R. Co., Asst. Chief Engineer	a	Southern Pacific Bldg., San Francisco	Newlove
E. Stamm	a	Antioch	Antioch
Del Norte County			
Hemstreet & Bell	b	411 C St., Marysville	Crescent City

El Dorado County			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs
Hemstreet & Bell	b	411 C St., Marysville	Placerville
Fresno County			
Grant-Pacific Rock Co.	a, b	Box 656, Fresno	El Prado
Grant-Service Rock Co., Cons.*	a, b	T. W. Patterson Bldg., Fresno	El Prado
Austin Merk	a	North and Cherry Sts., Fresno	El Prado
Pacific Coast Aggregates, Inc.*	b	85 2d St., San Francisco	Piedra
Stewart & Nuss	a, b	410 Thorne St., Fresno	Herndon
Glenn County			
Southern Pacific Co.	a	65 Market St., San Francisco	Wyo
E. B. Bishop	a	Box 325, Orland	Wyo
Humboldt County			
D. A. Boyd	a	R.F.D., Arcata	Arcata
Hemstreet & Bell	a	411 C St., Marysville	Garberville
Mercer Fraser Co.	a	2d and Commercial St., Eureka	Essex and Fernbridge
Imperial County			
R. M. Albee	a	R.F.D. 2, Box 75, Brawley	Holtville
Brawley Concrete Co.	a	Brawley	Brawley
Imperial Rock Corp.	a	3232 E. 50th St., Vernon, Los Angeles	Niland
Inyo County			
Inyo Marble Co.	a	726-732 E. 29th St., Los Angeles	Lone Pine
Kern County			
Bakersfield Rock and Gravel Co.	a, b	Box 395, Station A, Bakersfield	Bakersfield
Fred Foth	a	2202 Arlington, Bakersfield	Bakersfield
C. W. Hartman	a	W. Oak St., Bakersfield	Bakersfield
Kern Rock Co., Ltd.	a, b	Box 1697, Bakersfield	Kern River
G. A. Padfield	a	120 4th St., Bakersfield	Bakersfield
Lassen County			
Red River Lumber Co.	b	Westwood	Westwood
Los Angeles County			
Arrow Rock Co.	a	Box 155, Monrovia	Monrovia
A. T. & S. F. R.R., I. L. Hibbard, Gen. Mgr.	a	609 Kerckhoff Bldg., Los Angeles	Forbes
Azusa Rock & Sand Co.	a, b	R.F.D., Azusa	Azusa
Richard R. Ball	a	Box 233, Walteria	Walteria
Blue Diamond Corp., Ltd.	a	1650 S. Alameda St., Los Angeles	El Monte and Roscoe
Wm. J. Bonfield	g	2008 Laurel Canyon Rd., Los Angeles	Hollywood
Chandler Palos Verdes S. & G., L. Chandler	a, b	Lomita	Lomita
City Rock Co.	a, b	Box A, Sunland	Sunland

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

*Consolidated July 1, 1938 to form Grant-Pacific Rock Co.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Los Angeles County—Continued			
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Whittier and Fullerton
Ducey & Atwood Rock Co., R. K. Atwood, Pres.	a, b	Box 194, East Pasadena	East Pasadena
Eastside Building Materials Co.	a	8830 Santa Monica Blvd., Los Angeles	
Eaton Canyon Rock & Sand Co.	a, b	Box 95, East Pasadena	East Pasadena
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Graham Bros.	a, b	3425 Fowler Ave., Los Angeles	Catalina Island and Roscoe
Granite Material Co.	g	8200 Tujunga Ave., Roscoe	Roscoe
John D. Gregg	a, b	Box 110, Whittier	Whittier
Haines Canyon Rock Co., John M. Ferry	a, b	5201 San Fernando, Glendale	Glendale
Hideeker Brick Co.	b	1117 S. Boyle Ave., Los Angeles	Bouquet Canyon
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Bureau of Water Works and Supply, Att. H. A. Van Norman	a	207 S. Broadway, Los Angeles	
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Manning Bros. Rock & Sand Co.	a, b	Irwindale	Irwindale
Owl Truck & Materials Co.	b	Box 509, Compton	Compton
Pacific Rock & Gravel Co.	a, b	800 Lane Mortgage Bldg., 208 W. 8th St., Los Angeles	
Reynolds Crushed Gravel	g	920 N. Humphreys Ave., Los Angeles	Los Angeles
Rohl-Connolly Co.	b	4351 Alhambra Ave., Los Angeles	Catalina Island
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita
State Decomposed Granite Co.	g	8455 Santa Monica Blvd., Los Angeles	Los Angeles
J. H. Weadle	a, b	Monrovia	Monrovia
Marin County			
Daniels Const. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Co.	b	329 17th St., Oakland	San Quentin
Mariposa County			
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
Merced County			
Bair Creek Sand & Gravel Co., J. W. Huffman	a	Merced	
Frank B. Marks	a, b	Newman	Los Banos
Modoc County			
Great Northern Railway, A. E. Knight, Supt.	e	Klamath Falls, Ore.	Mammoth
Southern Pacific R.R. Co., Att. Ass't Chief Engineer	b	Southern Pacific Bldg., San Francisco	Goose Lake

Monterey County			
Del Monte Properties, C. S. Olmsted	a, c	Del Monte	Del Monte
M. J. Murphy	a	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Pratteo
S. Ruthven, Seaside Sand Pit	a	Seaside	Seaside
Southern Pacific Co.	a	65 Market St., San Francisco	Lapis
Tynan Lumber Co.	a	Salinas	Salinas
Napa County			
Basalt Rock Co.	b	8th St., Napa	Napa
Errington Quarry & Juarez Quarry, M. L. Reidenbach	b	Napa	Napa
Southern Pacific R.R. Co., Att. Ass't Chief Engineer	b	Southern Pacific Bldg., San Francisco	Rocktram
Thorsen Gravel Pit, Harry Thorsen	a	St. Helena	St. Helena
Nevada County			
D. T. Brown	a, b	Grass Valley	Grass Valley
Netz Granite Quarry, Ludwig Netz	b	Nevada City	Nevada City
Orange County			
E. M. Barris Sand & Gravel Co.	a	Newport Beach	Newport Beach
California Rock Co.	a, b	R.F.D., Orange	Orange
Consolidated Rock Products Co	a	2730 S. Alameda St., Los Angeles	Fullerton and Orange
Foster Sand & Gravel Co., W. Commonwealth	a	Fullerton	Fullerton
Fowler Sand & Gravel Co.	a	1178 S. Flower St., Santa Ana	Santa Ana
Graham Bros.	a, b	3425 Fowler Ave., Los Angeles	El Modena
National Cement Pipe Co.	a	Box 596, Santa Ana	Santa Ana
B. A. Stoffel	a	Anaheim	Anaheim
Placer County			
Roseville Sand Co.	a	115 Jones St., Roseville	Roseville
A. Teichert & Son, Inc.	a	1846 37th St., Sacramento	No. Fork American River
Union Granite Co., Ruhkala Bros.	b	Rocklin	Rocklin
Victor Wiekman	b	Rocklin	Rocklin
Plumas County			
Western Pacific R.R. Co., E. W. Mason, Gen. Sup't.	b	Mills Bldg., San Francisco	
Riverside County			
A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.	b	609 Kerekhoff Bldg., Los Angeles	Corona
Concrete Rock & Sand Co.	a	899 La Cadena St., Colton	Colton
City of Riverside	b	Riverside	Riverside
Rohl-Connolly Co., Ormond Quarry	b	4351 Valley Blvd., Los Angeles	Bly Junction
San Goronio Rock Co.	a	Banning	Banning
The Service Gravel Co., F. A. Braman	a	4324 10th St., Riverside	Riverside
J. F. Shea Co., Inc.	a	617 S. Olive St., Los Angeles	Banning
P. J. Weisel, Industrial Sands	a, c	La Habra	Corona

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Sacramento County			
Brighton Sand & Gravel Co.	a, b	P.O. Box 2604, Sacramento	Sacramento
Canon & Co.	c	Box 281, Sacramento	Ben Ali
Del Paso Rock & Gravel Co.	a, b	H St. Rd., Sacramento	Del Paso
Folsom State Prison	b	Represa	Represa
Lord & Bishop	a	P.O. Box 812, Sacramento	American River
Mucke Sand & Gravel Co.	a, b	1433 57th St., Sacramento	Mayhew
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhew and American River
Perkins Gravel Co.	a, b	Perkins	Perkins
Robert Powell & Co.	a	Box 815, Sacramento	American River
San Benito County			
Granite Rock Co.	b	Drawer M, Watsonville	Logan
Southern Pacific Co.	a, b	65 Market St., San Francisco	Logan
San Bernardino County			
A. T. & S. F. R.R.	a	600 Kerckhoff Bldg., Los Angeles	Gale
Commercial Rock Co.	a, b	14th and Campus, Upland	Upland
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles	
Fourth Street Rock Crusher, A. O. Johnson	a	San Bernardino	San Bernardino
Pacific Minerals, Inc.	d	337 10th St., Richmond	Barstow
Pinneys Sand & Rock Service	a	Redlands	Redlands
Redlands Gravel Co.	a, b	Redlands	Redlands
San Bernardino Rock & Gravel Co.	a, b	Box 249, San Bernardino	San Bernardino
Southern Pacific R.R. Co., Asst. Chief Engineer	b	Southern Pacific Bldg., San Francisco	Deelezville
Triangle Rock & Gravel Co.	a, b	San Bernardino	San Bernardino
San Diego County			
Calaveras Materials Co.	b	Oceanside	Oceanside
Canyon Rock Co.	a, b	3911 5th Ave., San Diego	San Diego
Crystal Silica Sand Co.	a	Oceanside	Oceanside
H. G. Fenton Material Co.	a	13th and Imperial Ave., San Diego	San Diego
Elvira M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a	Carlsbad	Oceanside
San Francisco County			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco

San Joaquin County			
Frank Marks	a	Newman	Tracy
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand and Gravel Co., W. A. Arlington		Box 271, Escalon	Escalon
Elmer J. Warner	a	R.F.D. 3, Box 85, Stockton	Stockton
San Luis Obispo County			
Guiton Molding Sand, Harold E. Guiton	c	Oceano	Oceano
Renolds Quarry, Thomas C. Renolds	b	Box 53, Paso Robles	Paso Robles
San Mateo County			
Industrial Mineral Products, W. B. Vestal, Pres.	c	400 7th St., San Francisco	
Market Street Ry. Co., Daly's Quarry	b	58 Sutter St., San Francisco	Daly City
Santa Barbara County			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
Santa Clara County			
Anderson Gravel Co.	a	Mountain View	Mountain View
Carroll Gravel Pit, R. D. Carroll	a	R.F.D. 14, Box 310A, San Jose	San Jose
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Chas. W. Hamilton	a	Senter Rd., San Jose	San Jose
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Southern Pacific Co.	a	65 Market St., San Francisco	Coyote
Santa Cruz County			
Central Supply Co.	a	Box 524, Santa Cruz	Santa Cruz
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
Shasta County			
Diestelhorst Gravel Plant, Chas. Dieselhorst	a, b	1040 Liberty St., Redding	Redding
Lassen Volcanic Nat'l Park, Superintendent	b	Mineral via Red Bluff	Lassen Nat'l Park
Oaks Gravel Plant, G. E. Oaks	a	1341 Yuba St., Redding	Girvan
Southern Pacific R.R. Co., Asst. Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kennett
Sierra County			
Henstreet & Bell	b	411 C St., Marysville	Downieville
Siskiyou County			
King Solomon Mines Co.	f	Crocker Bldg., San Francisco	Black Bear
W. D. Miller Cons. Co.	a	Box 168, Klamath Falls, Ore.	Graham Siding
Southern Pacific R.R. Co., Asst. Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kegg
A. Young	a	345 N. Main St., Yreka	Yreka

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Solano County			
Hartley Sand & Gravel Co., J. J. Hartley, Prop.	a	Dixon	Dixon
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
Sonoma County			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
Stanislaus County			
W. Haslan	a	Oakdale	Oakdale
O. A. Kauffman	a	803 First St., Modesto	Modesto
Frank B. Marks	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Pacific Coast Aggregates, Inc.	a, b	85 Second St., San Francisco	Oakdale
Putnam Sand & Gravel Co	a	Box 486, Modesto	Modesto
Rinehart Sand Pit, H. T. Rinehart	a	Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Southern Pacific Co.	a	65 Market St., San Francisco	Newman
Chas. Warner	a	Modesto	Modesto
Trinity County			
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't.	b	Sausalito	Island Mountain
Tulare County			
Dinuba Cement Co.	a	Dinuba	Dinuba
Independent Construction Co.	b	Foot of 47th Ave., Oakland	
O. C. Jeffers	a	1032 River Rd., Porterville	Porterville
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Lemon Cove and Lindsay
Porterville Cement Pipe Co.	a	Box 396, Porterville	Porterville
W. R. Spalding Lumber Co.	a, b	Visalia	Visalia
Tuolumne County			
Beerman & Jones	b	Sonora	Soulsbyville
Ventura County			
El Rio Rock Co.	a, b	Box 381, Ventura	El Rio
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Piru Rock Co.	a, b	Piru	Piru
Santa Paula Rock Co.	a	Willard Bridge, Santa Paula	Santa Paula
Saticoy Rock Products Co.	a, b	Ventura	Saticoy-Ventura
J. S. Toler	c	1257 Poli St., Ventura	Ventura
Southern Pacific Co.	a, b	65 Market St., San Francisco	Rockbank and Chrisman

Yolo County			
Beckwith Bros.	a	Broderick	Broderick
Leroy Kerr	a	Yolo	Yolo
Frank Newman	a	Woodland	Woodland
Joe Schwarzgruber	a	Woodland	Woodland
George Summers	a	Woodland	Woodland
Yolo Gravel Co.	a	Box 7, Yolo	Yolo
Yuba County			
Hemstreet & Bell	a, b	501 11th St., Marysville	Marysville
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

SULPHUR

Operator	Address	Location of mine
Inyo County		
Western Mining Co.	1427 E. 4th St., Los Angeles	Last Chance Mts.

TUNGSTEN

Mine	Operator	Address	Location of mine
Fresno County			
Quigley Bros. Mine	Geo. W. Quigley	Box 63, Auberry	Kings River
Inyo County			
Bishop	El Diablo Mining Co., H. O. Johanson	Bishop	Bishop
Pine Creek	U. S. Vanadium	Bishop	Bishop
Rossi	Bishop Tungsten Company, A. T. Wilkerson	Bishop	Bishop
Tungsten City	El Diablo Mining Company, H. O. Johanson	Bishop	Bishop
Tungsten City	Tungsten Milling Co., Raymond A. Stolle	Box 461, Bishop	Bishop
Mono County			
Black Rock Tungsten Mine	Tungsten Corp. of Calif.	811 W. 7th St., Los Angeles	Benton
San Bernardino			
Atolia	Atolia Mining Co.	1022 Crocker Bldg., San Francisco	Atolia
Adelanto	Nicholas Baxter	1316 Perris St., San Bernardino	Adelanto
Bille A. Mine	R. T. Rosso	Victorville	Victorville
North Tungsten Fields	Shadow Mountain Tungsten, Inc.*	715 Commercial Exchange Bldg., Los Angeles	Adelanto
Tulare County			
Tungsten	Tungsten Mines	929 American Ave., Long Beach	Posey

*Gave up lease in 1938.

APPENDIX

PUBLIC RESOURCES CODE

An act to establish a Public Resources Code, thereby consolidating and revising the law relating to natural resources, the conservation, utilization, and supervision thereof, and matters incidental thereto, and to repeal certain acts and parts of acts specified herein.

Chapter 93 (Stat. 1939.)

The people of the State of California do enact as follows:

GENERAL PROVISIONS.

1. This act shall be known as the Public Resources Code.

2. The provisions of this code, in so far as they are substantially the same as existing provisions relating to the same subject matter shall be construed as restatements and continuations thereof and not as new enactments.

3. All persons who, at the time this code goes into effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold the same according to the former tenure thereof.

4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by the provisions of this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.

5. Unless the context otherwise requires, the general provisions hereinafter set forth shall govern the construction of this code.

6. Division, part, chapter, article, and section headings contained herein shall not be deemed to govern, limit, modify or in any manner affect the scope, meaning, or intent of the provisions of any division, part, chapter, article, or section hereof.

7. Whenever, by the provisions of this code, an administrative power is granted to a public officer or a duty imposed upon such officer, the power may be exercised or the duty performed by a deputy of the officer or by a person authorized pursuant to law.

8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement or record is required by this code, it shall be made in writing in the English language.

9. Whenever any reference is made to any portion of this code or of any other law of this State, such reference shall apply to all amendments and additions thereto now or hereafter made.

10. "Section" means a section of this code unless some other statute is specifically mentioned.

11. The present tense includes the past and future tenses; and the future the present.

12. The masculine gender includes the feminine and neuter.

13. The singular number includes the plural, and the plural the singular.

14. "County" includes "city and county."

15. "Shall" is mandatory and "may" is permissive.

16. "Oath" includes affirmation.

17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.

18. If any provision of this code, or the application thereof to any person or circumstances, is held invalid the remainder of the code, and the application of its provisions to the other persons or circumstances, shall not be affected thereby.

DIVISION 1. THE DEPARTMENT OF NATURAL RESOURCES.

501. There is in the State government a Department of Natural Resources. The department shall be conducted under the control of an executive officer known as the Director of Natural Resources. The director shall be appointed by and hold office at the pleasure of the Governor and shall receive a salary of six thousand dollars a year.

502. Except as in this division otherwise provided, the provisions of article II, Chapter III, Title I, Part III of the Political Code shall govern and apply to the conduct of the Department of Natural Resources in every respect the same as if such provisions were herein set forth at length, and wherever in that article the term "head of the department" or similar designation occurs, it shall for the purposes of this division mean the Director of Natural Resources.

503. For the purposes of administration the department shall be organized by the director, subject to the approval of the Governor, in such manner as he deems necessary properly to segregate and conduct the work of the department. The director may appoint, in accordance with the civil service and other provisions of law, such deputies, officers, and other expert and clerical assistants as may be necessary.

504. The work of the department shall be divided into at least four divisions, known as Division of Forestry, the Division of Parks, The Division of Fish and Game, and The Division of Mines.

505. The Division of Forestry shall be administered through a chief who shall be known as the State Forester. He shall be a technically trained forester, appointed by the director upon nomination by the State Board of Forestry. General policies for the guidance of the Division of Forestry shall be determined by a State Board of Forestry which shall consist of seven members appointed by and holding office at the pleasure of the Governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with live stock industry, one with general agriculture, and one with the problems of water conservation.

506. The Division of Parks shall be administered through a chief who shall be appointed by the director upon nomination by the State Park Commission. General policies for the administration of the State park system shall be determined by the State Park Commission which shall consist of five members appointed by and holding office at the pleasure of the Governor.

507. The Division of Mines shall be administered through a chief who shall be known as the State Mineralogist. He shall be a technically trained mining engineer, appointed by the director upon nomination by the State Mining Board. General policies for the guidance of the Division of Mines shall be determined by a State Mining Board, which shall consist of five members appointed by and holding office at the pleasure of the Governor.

508. The Division of the Department of Natural Resources for the supervision of oil and gas shall be in charge of a chief, known as the State Oil and Gas Supervisor.

509. The salaries of the chiefs of the Divisions of Forestry and Parks shall be fixed by the director with the approval of the Governor. The director and the chief of each division, before entering upon his duties, shall execute and deliver to the State an official bond in the sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties.

510. The members of the Board of Forestry and the State Park Commission shall serve without compensation, but shall be entitled to their actual necessary expenses incurred in the performance of their duties.

512. The Department of Natural Resources may expend the money in any appropriation or in any special fund in the State treasury made available by law for the administration of the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office, or officer whose duties, powers, and functions have been transferred to and conferred upon the department. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which the appropriations were made or the special funds created.

513. The department shall have possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property, real or personal held for the benefit or use of all bodies, offices, and

officers whose duties, powers, and functions have been transferred to and conferred upon the department.

514. Nothing in this code is intended to supersede, modify or change the effect of the enactment of section 373g of the Political Code, and wherever in this code reference is made to any officer or agency of the Department of Natural Resources, it is made in the sense and with the same legal effect as was attributable thereto in the statute whence derived and which would continue to be so attributable but for the adoption of this code.

DIVISION II. MINES AND MINING.

Chapter 1. Definitions.

2001. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of Division II of this code.

2002. "Department" in reference to the government of this State, means the Department of Natural Resources.

2003. "Division" in reference to the government of this State, means the Division of Mines in the Department of Natural Resources.

2004. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

Chapter 2. The Division of Mines.

2200. For the purposes of this chapter "mine" includes all mineral bearing properties of whatever kind or character, whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained. "Mineral" for the purposes of this chapter includes all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

2201. The State Mineralogist shall employ competent geologists, field assistants, qualified specialists, and office employees when necessary in the execution of the plans and operations of the division under this chapter and shall fix their compensation.

2202. The State Mineralogist shall maintain offices, and a museum, library, and laboratory in San Francisco for the purposes provided in this chapter.

2203. The State Mineralogist shall make a biennial report to the Governor on or before the fifteenth day of September next preceding the regular session of the Legislature.

2204. The State Mineralogist may receive on behalf of this State, for the use and benefit of the division, gifts, bequests, devices, and legacies of real or other property and may use the same in accordance with the wishes of the donors. If no instructions are given by the donors, the State Mineralogist shall manage, use, and dispose of the gifts, bequests, and legacies for the best interests of the division and in such manner as he may deem proper.

2205. The State Mineralogist shall:

(a) Make, facilitate, and encourage special studies of the mineral resources and mineral industries of the State.

(b) Collect statistics concerning the ocurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use.

(c) Make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance such collection constituting the museum of the division.

(d) Provide a library of books, reports, and drawings bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy, such library constituting the library of the division.

(e) Make a collection of models, drawings, and descriptions of the mechanical appliances used in mining and metallurgical processes.

(f) Preserve and so maintain such collections and library as to make them available for reference and examination, and open to public inspection at reasonable hours.

(g) Maintain, in effect, a bureau of information concerning the mineral industry of this State to consist of such collections and library, and arrange, classify,

catalogue, and index the data therein contained, in a manner to make the information available to those desiring it.

(h) Issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this State.

2206. The State Mineralogist may prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the State.

2207. The owner, lessor, lessee, agent, manager, or other person in charge of any mine of whatever kind or character within the State shall forward to the State Mineralogist, upon his request, at his office, not later than the thirty-first day of March in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men employed, the method of working the mine and the general condition thereof, and the total mineral production for the past year. He shall also furnish any additional information relative to such mine that the State Mineralogist may from time to time require for the proper discharge of his official duties. Any such person who fails to comply with the provisions of this section is guilty of a misdemeanor.*

2208. The State Mineralogist or a qualified assistant may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, and other mineral properties or working plants in this State in order to gather data to comply with the provisions of this chapter.

2209. The State Mineralogist may fix a price upon and dispose of to the public all publications of the division, including reports, bulletins, maps, registers, or other publications. The price shall approximate the cost of publication and distribution. He may also furnish the publications of the division to public libraries without cost and may exchange publications with geological surveys, scientific societies, and other like bodies.

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* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

PUBLICATIONS OF THE DIVISION OF MINES

During the past fifty-six years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

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13—77436

REPORTS

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**Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks	----
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**Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Irelan, Jr.	----
**Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.	----
**Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr.	----
**Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.	----
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**Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper	----
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**Fourteenth Report of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915: A General Report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth	----
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**Bulletin No. 10. A Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by Anthony W. Vogdes. 1896, 121 pp. ----

**Bulletin No. 11. Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties, by W. L. Watts. 1897, 94 pp., 6 maps, 31 illustrations ----

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**Bulletin No. 16. The Genesis of Petroleum and Asphaltum in California, by A. S. Cooper. 1899, 39 pp., 29 illustrations ----

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**Bulletin No. 24. The Saline Deposits of California, by G. E. Bailey. 1902, 216 pp., 99 illustrations, 5 maps ----

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**Bulletin No. 44. California Mines and Minerals for 1905, by Charles G. Yale. 1907, 31 pp., 20 county maps ----

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